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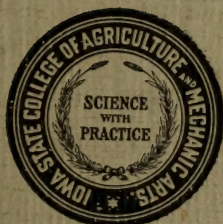
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IOWA STATE COLLEGE

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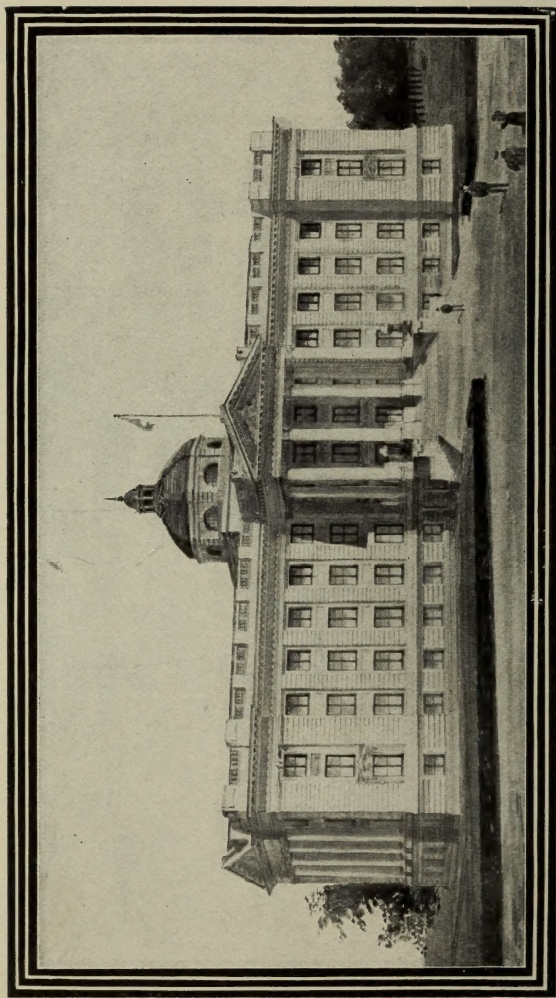
Agriculture and Mechanic Arts

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Iowa State



DIVISION OF AGRICULTURE

1908-1909



THE NEW AGRICULTURAL BUILDING

IOWA STATE COLLEGE

OF

AGRICULTURE AND
MECHANIC ARTS



DIVISION OF AGRICULTURE

AUGUST, 1908

AMES, IOWA

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LIBRARY
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Separate announcements of the Engineering, Agricultural and Veterinary Divisions as well as the College Catalogue, Compendium and Short Course announcements will be sent gratuitously to anyone wishing them. In calling for announcements, please state the Division concerning which information is desired. Address all communications to A. B. Storms, President of Iowa State College, Ames, Iowa.



CALENDAR 1908-09

FIRST SEMESTER.

September 1-2, Tuesday and Wednesday	Entrance Examinations.
September 3, Thursday, 7:45 A. M.	First Semester begins.
September 3-5, Thursday to Saturday	Registration and Classification Days.
September 7, Monday, 7:45 A. M.	College Work begins.
September 19, Saturday, 8:00 P. M.	Y. M. C. A. and Y. W. C. A. Reception.
October 1, Tuesday	Last Date for Presentation of Subjects for Bachelor's Degree.
October 3, Saturday, 8:00 P. M.	Junior Trot.
October 17, Saturday, 8:00 P. M.	Sophomore-Freshman Annual.
October 21, Wednesday	College Day.
November 26-27-28, Thursday to Saturday	Thanksgiving Vacation.
December 21-22, Tuesday and Wednesday	Semester Examinations.
December 23, Wednesday, 5:00 P. M.	College Work closes.

1909.

January 4-16, Monday to Saturday Special Short Courses in Agriculture and Domestic Economy.

1909.

January 19-20, Tuesday and Wednesday	Entrance Examinations.
January 21-23, Thursday to Saturday	Registration and Classification Days.
June 10, Thursday	Second Semester closes.

BOARD OF TRUSTEES

MEMBERS OF THE BOARD.

HON. A. B. CUMMINS	<i>Ex-Officio</i>	Governor of Iowa
HON. JOHN F. RIGGS	<i>Ex-Officio</i>	Superintendent of Public Instruction
HON. H. M. LETTS	First District	Columbus Junction
HON. VINCENT ZMUNT	Second District	Iowa City
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HON. JAMES H. WILSON	Ninth District	Adair
HON. J. B. HUNGERFORD	Tenth District	Carroll
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HERMAN KNAPP	Ames	Treasurer
W. A. HELSELL	Odebolt	Financial Secretary
BEN EDWARDS	Ames	Custodian

OFFICERS OF INSTRUCTION

THE FACULTY.

ALBERT BOYNTON STORMS, A. M., D. D., LL. D.,
President, Dean of the Division of Science, 1903.*

CHARLES FRANKLIN CURTISS, M. S. A., D. S.,
Dean of the Division of Agriculture, Director of Experiment Station,
1897, 1891.

HON. JAMES WILSON, M. S. A.,
Lecturer in Agriculture, 1902, 1891.

GEORGE L. MCKAY,
Professor of Dairying, 1900, 1894.

WILLARD JOHN KENNEDY, B. S. A.,
Professor of Animal Husbandry, 1901.

WILLIAM HENRY STEVENSON, A. B., B. S. A.,
Professor of Soils, 1903, 1902.

SPENCER A. BEACH, B. S. A., M. S.,
Vice Dean of the Division of Agriculture, Professor of Horticulture, 1905.

J. BROWNLEE DAVIDSON, B. S., M. E.,
Professor of Agricultural Engineering, 1907, 1905.

ARTHUR THOMAS ERWIN, B. S., M. S. A.,
Associate Professor of Horticulture, 1904, 1900.

M. L. BOWMAN, B. S. A.,
Associate Professor of Farm Crops, 1906, 1905.

FRANK WILLIAM BOUSKA, M. S. A.,
Associate Professor of Dairying, Dairy Bacteriologist, 1906, 1897.

J. A. McLEAN, B. A., B. S. A.,
Associate Professor of Animal Husbandry, 1907, 1906.

CHARLES A. SCOTT, B. S. A.,
Associate Professor of Forestry, 1908.

IRA OBED SCHAU, B. S.,
Assistant Professor of Soils, 1904.

*First date after the title indicates the date of appointment to present position, the second date, when the first fails to do so, indicates the date of first appointment in the college.

IOWA STATE COLLEGE

HUGH G. VAN PELT, B. S. A.,
Assistant Professor of Animal Husbandry and Superintendent of
Dairy Farm, 1906.

JOHN BOWER, B. S. A.,
Assistant Professor of Dairying, 1906.

H. C. PIERCE,
Instructor in Animal Husbandry in Charge of Poultry, 1906.

L. E. CARTER, B. S. A.,
Instructor in Agricultural Journalism, 1906.

E. W. HAMILTON, B. S. A.,
Instructor in Agricultural Engineering, 1907.

HARRY G. BELL, B. S. A.,
Instructor in Farm Crops, 1907.

B. W. CROSSLEY, B. S. A.,
Instructor in Farm Crops, 1907.

HERMAN HORNEMAN,
Instructor in Dairying, 1907.

JOSEPH FREDERICK BARKER, B. S. A.,
Instructor in Soils, 1908.

JULIUS ERDMANN,
Gardener, 1904.

GEORGE MITCHELL,
Farm Foreman, 1906.

JOHN T. HOOVER,
Assistant in Agricultural Engineering, 1906.

E. N. WENTWORTH, B. S. A.,
Assistant in Animal Husbandry, 1907.

ORMA J. B. SMITH, B. S.,
Assistant in Horticulture, 1907.

LAURENZ GREEN, B. S.,
Assistant in Horticulture, 1907.

R. E. CARR,
Assistant in Agricultural Engineering, 1907.

EDGAR WILLIAMS STANTON, M. S., LL. D.,
Dean of the Junior College, Professor of Mathematics, 1877, 1874.

JOHN H. McNEIL, V. M. D.,
Dean of the Division of Veterinary Medicine, Professor of Veterinary
Medicine and Surgery, 1903, 1900.

GENERAL JAMES RUSH LINCOLN,
Professor of Military Science, 1884.

ALFRED ALLEN BENNETT, M. S.,
Professor of Chemistry, 1885.

LOUIS HERMANN PAMMEL, B. AG., M. S., PH. D.,
Professor of Botany and General Bacteriology, 1889.

MISS LIZZIE MAY ALLIS, A. M.,
Professor of Modern Languages, 1896.

SAMUEL WALKER BEYER, B. S., PH. D.,
Vice Dean of the Division of Engineering, Professor of Geology and
Mining Engineering, 1898, 1891.

ALVIN BUELL NOBLE, B. PH.,
Professor of Rhetoric and Literature, 1898.

HENRY ELIJAH SUMMERS, B. S.,
Professor of Zoology, 1898.

ORANGE HOWARD CESSNA, A. M., D. D.,
Professor of History and Psychology, 1900.

ADRIAN M. NEWENS, B. O.,
Professor of Public Speaking, 1902, 1896.

RICHARD CORNELIUS BARRETT, A. M., LL. B.,
Professor of Civics, 1904.

BENJAMIN H. HIBBARD, B. AG., PH. D.,
Professor of Economic Science, 1906, 1902.

ARTHUR MACMURRAY, B. A., M. O.,
Professor of Public Speaking, 1908.

MISS MARIA M. ROBERTS, B. L.,
Associate Professor of Mathematics, 1904, 1891.

MISS LOLA ANN PLACEWAY, B. S.,
Associate Professor of Chemistry, 1905, 1896.

WINFRED F. COOVER, A. M.,
Associate Professor of Chemistry, 1907, 1904.

CHARLES H. STANGE, D. V. M.,
Associate Professor of Histology, Pathology and Therapeutics, 1907.

MISS ELIZABETH MACLEAN, M. D.,
Assistant Professor of English, 1903, 1899.

JOSEPH EDWARD GUTHRIE, M. S.,
Assistant Professor of Zoology, 1904, 1902.

ERNEST ALANSON PATTENGILL, B. S.,
Assistant Professor of Mathematics, 1906, 1900.

MISS JULIA COLPITTS, A. M.,
Assistant Professor of Mathematics, 1906, 1900.

ROBERT EARLE BUCHANAN, M. S.,
Assistant Professor of General Bacteriology, 1906, 1904.

LOUIS BERNARD SCHMIDT, A. M.,
Assistant Professor of History, 1906.

WILLIAM E. MADSON, D. V. M.,
Assistant Professor of Physiology, Sanitary Science, 1907.

MISS ANNIE FLEMING, B. S.,
Instructor in Mathematics, 1900.

MISS GRACE ISABEL NORTON, B. A.,
Instructor in German, 1901.

WARD MURRAY JONES, B. C. E.,
Instructor in Mathematics, 1902.

MISS FLORENCE LUCAS,
Instructor in French, 1903.

MISS LISLE McCOLLOM, B. A.,
Instructor in German, 1904.

MISS ELIZABETH MOORE, PH. M.,
Instructor in English, 1904.

MISS SYBIL LENTNER, B. S.,
Instructor in Public Speaking, 1904.

MISS DORA GILBERT TOMPKINS, A. M.,
Instructor in English, 1905.

MISS ESTELLE DENNIS FOGEL, B. A., B. S.,
Instructor in Botany, 1906, 1904.

C. E. BARTHOLOMEW, M. S.,
Instructor in Entomology, 1905, 1904.

MISS ETHYL CESSNA, B. S.,
Instructor in History, 1905, 1904.

MISS KEO ANDERSON, B. S.,
Instructor in Mathematics, 1905.

MISS JULIA RAMSEY VAULX, A. M.,
Instructor in English, 1906.

MISS LOLA STEPHENS, B. S.,
Instructor in Chemistry, 1906, 1905.

MISS CLARA BAKER, B. PH.,
Instructor in English, 1906.

MISS LOUISE PETERS, A. M.,
Instructor in German and Spanish, 1907,

W. R. RAYMOND, B. A.,
Instructor in English, 1907.

INGEBORG LOMMEN, B. L., M. L.,
Instructor in German, 1907.

LAURA TAGGART, B. S.,
Instructor in Chemistry, 1907, 1906.

MELISSA FLYNN, B. S.,
Instructor in Chemistry, 1907, 1906.

MISS HELEN F. SMITH, A. B.,
Instructor in Mathematics, 1907.

MISS MAUDE AGETON, B. A., B. S.,
Instructor in History, 1907.

JOHN E. BRINDLEY, A. M.,
Instructor in Economic Science, 1907.

MISS FREDRICA V. SHATTUCK, A. B.,
Instructor in Public Speaking, 1907.

MISS SADIE JACOBS, A. B.,
Instructor in English, 1907.

MISS GEORGIA HOPPER, B. A., PH. M.,
Instructor in German and Spanish, 1907.

*MISS VINA ELETHE CLARK,
Librarian, 1897.

MISS CAROLYN GRIMSBY, B. S.,
Acting Librarian, 1907, 1905.

MISS HARRIETTE KELLOGG, A. M.,
Curator of the Herbarium, 1903.

MISS EMMA LEONARD, B. S.,
Reference Librarian, 1907.

HENRY NESS, B. S.,
Assistant in Zoology, 1906.

MARGARET FORGEUS, A. B.,
Library Cataloguer, 1906.

*Leave of absence for the year 1907-8.

IOWA STATE COLLEGE

WINFIELD S. DUDGEON, B. S.,
Assistant in Botany, 1907, 1905.

MISS LILLIAN M. LISTER,
Laboratory Assistant in Chemistry, 1907.

R. W. GETCHELL, B. S. A.,
Laboratory Assistant in Chemistry, 1907.

MISS MABEL RUNDALL, B. S.,
Assistant in English, 1907.

MISS MAY PARDEE, PH. B.,
Assistant in English, 1907.

MRS. ELEANOR HOLLOWAY,
Assistant Librarian, 1907.

ROYAL JEFFS, B. S. A.,
Assistant in Botany, 1907.

J. WERSHOW, B. S., PH. B.,
Laboratory Assistant in Chemistry, 1908.

ADA HAYDEN,
Student Assistant in Botany, 1906.

H. F. WATT,
Student Assistant in Botany, 1907.

LOUIS E. ORCUTT,
Student Assistant in English, 1908.

JESSE McKEEN,
Student Assistant in Chemical Laboratory.

SHIRLEY W. ALLEN,
Student Assistant in Library, 1906.

AGRICULTURAL EXPERIMENT STATION STAFF

ALBERT BOYNTON STORMS, A. M. D. D., LL. D.,
President Ex-Officio.

CHARLES FRANKLIN CURTISS, M. S. A., D. S.,
Director.

WILLARD JOHN KENNEDY, B. S. A.,
Vice Director and Animal Husbandry.

JOHN H. McNEIL, V. M. D.,
Veterinarian.

LOUIS HERMANN PAMMEL, B. Ag., M. S., Ph. D.,
Botanist.

HENRY ELIJAH SUMMERS, B. S.,
Entomologist.

GEORGE LEWIS McKAY,
Dairying.

WILLIAM HENRY STEVENSON, A. B., B. S. A.,
Soils.

LOUIS G. MICHAEL, B. S.,
Chemist.

SPENCER A. BEACH, B. S. A., M. S.,
Horticulturist.

ARTHUR T. ERWIN, B. S., M. S. A.,
Assistant Horticulturist.

J. BROWNLEE DAVIDSON, B. S., M. E.,
Agricultural Engineering.

M. L. BOWMAN, B. S. A.,
Farm Crops.

FRANK WILLIAM BOUSKA, M. S. A.,
Dairy Bacteriologist.

CHARLES A. SCOTT, B. S. A.,
Forester.

EDWIN ELIAS LITTLE, M. S. A.,
Assistant Horticulturist.

IOWA STATE COLLEGE

IRA OBED SCHAUB, B. S.,
Assistant in Soils.

HUGH G. VAN PELT, B. S. A.,
Assistant in Animal Husbandry.

J. A. McLEAN, B. A., B. S. A.,
Assistant in Animal Husbandry.

MISS CHARLOTTE KING,
Assistant in Botany.

MISS HARRIETTE KELLOGG, A. M.,
Assistant in Botany.

MATT L. KING, B. M. E.,
Experimentalist in Agricultural Engineering.

H. C. PIERCE,
Assistant in Animal Husbandry in Charge of Poultry.

L. C. BURNETT, M. S. A.,
Assistant in Farm Crops.

L. E. CARTER, B. S. A.,
Bulletin Editor.

JOHN H. CRISWELL, B. S.,
Assistant in Farm Crops.

ROBERT LORENZO WEBSTER,
Assistant in Entomology.

SCOTT S. FAY, B. S.,
Assistant in Soils.

STELLA HARTZELL, A. M.,
Assistant Chemist.

B. A. MADSON, B. S. A.,
Graduate Assistant in Chemistry.

IOWA HIGHWAY COMMISSION

Section 1, Chapter 105 of the Laws of 1904 provides that the Iowa State College of Agriculture and Mechanic Arts shall act as a Highway Commission for the State of Iowa.

HIGHWAY COMMISSION STAFF.

ANSON MARSTON, C. E.,
CHARLES FRANKLIN CURTISS, M. S. A.,
Directors.

THOS. H. MACDONALD, B. C. E.,
Highway Engineer.

J. BROWNLEE DAVIDSON, B. S., M. E.,
Engineer of Road Machinery.

AGRICULTURAL EXTENSION

ALBERT BOYNTON STORMS, A. M., D. D., LL. D.,
President, Ex-Officio.

CHARLES FRANKLIN CURTISS, M. S. A.,
Dean of Agriculture, Ex-Officio.

AGRICULTURAL EXTENSION STAFF.

PERRY GREELEY HOLDEN, M. S., B. PD.,
Superintendent.

A. V. STORM, PH. B.,
Schools.

RALPH K. BLISS, B. S. A.,
Animal Husbandry.

ADDISON H. SNYDER, B. S.,
Soils.

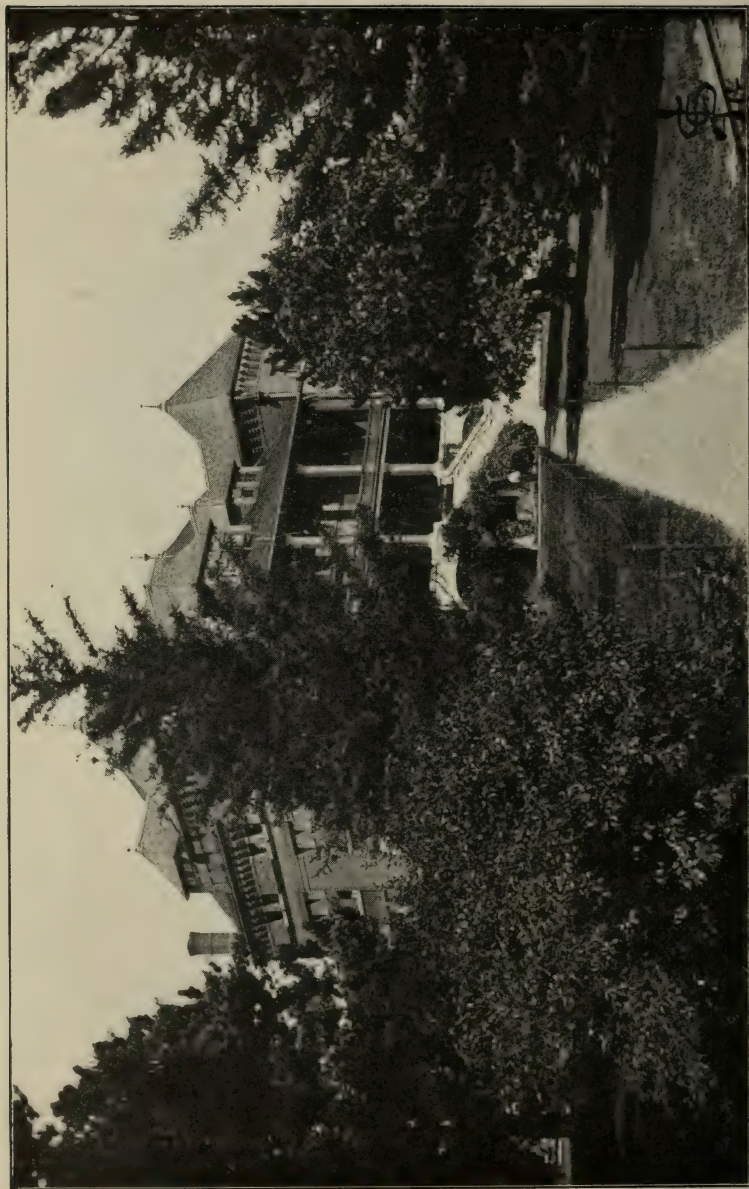
MARTIN L. MOSHER, B. S. A.,
Farm Crops.

R. E. DRENNAN, B. S. A.,
Animal Husbandry.

MISS EDITH G. CHARLTON,
Domestic Economy.

JAMES A. KING, A. B.,
Farm Crops.

MISS NEALE S. KNOWLES,
Domestic Economy.



THE OLD AGRICULTURE BUILDING

DIVISION OF AGRICULTURE

CHARLES F. CURTISS, DEAN.

SPENCER A. BEACH, VICE DEAN.

The division of Agriculture offers to its students work in any of the following courses:

Course in Agronomy.

Course in Dairying.

Course in Animal Husbandry.

Course in Horticulture.

Course in Science and Agriculture.

These courses are so arranged as to furnish a good foundation from which a student may become either a successful farmer or may develop into a specialist in one of the many branches of the Agricultural industry. The department offers short as well as the regular four year courses, the difference being due largely to the degree in which the student wishes to specialize in any line of work. The farm as it is usually conducted is a union of many divisions of industry, and the shorter course confines itself to laying a foundation that will secure success in all of these, while the longer course seeks to direct the student into that line which will call forth and centralize his special ability and at the same time enable him to meet the variety of conditions that under all circumstances surround a successful life.

Past experience with these courses shows that they have met with more than the usual success in attaining their objects; as the shorter course has been productive of many successful farmers, and the longer course has been unusually successful in developing better farmers and more capable men in practical life and also in securing for our graduates prominent positions in the agricultural faculties of other colleges.

In the courses in practical agriculture, a field of work which is unsurpassed by any other college in the United States is open to our students. The national government gives to the college about thirty-five thousand dollars annually for original experimentation and instruction in agriculture and the sciences related to this industry. This supplemented by liberal state aid, enables the College authorities to make the fields and the barns veritable laboratories of extensive and most practical investigation and observation. The range is from the soil which produces, through all of its natural characteristics to whatever is grown in agriculture from germ to finish.

The farm consisting of 1200 acres of rolling prairies, bottom and woodland is stocked with good representatives of six breeds of horses,

seven breeds of cattle, seven breeds of sheep and six breeds of hogs. These animals are used in class illustration and for the various experiments in breeding and feeding for milk, meat, wool, growth and maintenance, conducted by the Experiment Station as a department of the College. All the crops are grown for some educational purpose; all the animals are fed by rule and system, and the result of their management reported upon and used in class work.

Two commodious, well-lighted stock judging pavilions have recently been constructed, into which live animals are brought in the presence of the teacher and the class for careful study and intimate knowledge. An experimental barn with the recent and most approved methods of stalls, feeding and ventilation, is devoted exclusively to the original work of animal husbandry and agronomy, the work ranging over all the questions of breeding and maturing domestic animals.

The work of this department is designed to teach the sciences that underlie practical agriculture, and sufficient English, literature, mathematics, history, and other supplementary studies to sustain both scientific and practical agriculture and to develop the agricultural students to the level of the educated in any profession. Special attention is given to the improved methods in all of the various operations of farming, farm building, use of tools and machinery, and management of all kinds of stock and crops. The instruction embraces not only the principles but also the practices of agriculture.

AGRICULTURAL COURSES

All Students classified in the Agricultural Courses will take the same work until the beginning of the Sophomore year, when the selection of the desired course will be made by the student.

Academic Year

The Academic studies will not be required except so much as may be necessary to make up the thirty required and elective credits for admission to the Freshman Year. See index for Admission to the College.

FIRST SEMESTER.

		Required Semester Hours
Mathematics 3,	Algebra Review	5
English 2,	Rhetoric and Composition	5
Modern Language—		

The Language selected will be continued through the Academic Year.

Choice {	Language 1,	French 5	}	5
	Language 5,	German 5		
	Language 30,	Spanish 5		

Botany 1,	Elementary Botany	2
Public Speaking 2,	The Declamation	1
		—
	Total Semester Hours	18

SECOND SEMESTER.

		Required Semester Hours
Mathematics 5,	Plane Geometry	5
Literature 12,	English Classics	4
Modern Language—		
The Language selected must be a continuation of the one chosen at the beginning of the Academic Year.		
Choice { Language 2,	French 5 }	5
Language 6,	German 5 }	
Language 31,	Spanish 5 }	
History 16,	The National Period	3
		—
	Total Semester Hours	17

****Freshman Year**

FIRST SEMESTER.

		Required Semester Hours
Agricultural		
Engineering 1 or 2,	Shop Work	2
Animal Husbandry 1,	Market Types of Cattle and Sheep	2
Farm Crops 1,	Corn Growing and Judging	3
Horticulture 14,	Farm Forestry	3
Veterinary 55,	Anatomy of Domestic Animals	2
English 10,	Narration and Description	3
Mathematics 17,	Algebra and Trigonometry	3
History 19,	The Making of the Nation 1783-1817	2
Military 1,	Military Drill	..
Library 1,	Library instruction (4 hours dur- ing the semester)	—
	Total semester hours	20

****Freshmen** who show deficient preparation in English or Mathematics may be assigned by the Dean of the Junior College and the Dean of Agriculture, to special classes, with one credit hour more work than indicated above, or in case of clear indication of failure, even with this arrangement, they may be assigned to Academic classes.

SECOND SEMESTER.

Required
Semester Hours

Agricultural		
Engineering 1 or 2,	Shop Work	2
Animal Husbandry 2,	Market Types of Dairy Cattle,	
	Horses and Swine	2
Dairying 12,	Farm Dairying	3
Farm Crops 2,	Grains, Grasses and Forage Crops	3
Horticulture 2,	Plant Propagation	3
English 11,	Exposition	3
Physics 205,	Mechanics, Heat and Light	3
Military 2,	Military Drill	..
		—
	Total semester hours	19

DEPARTMENT OF AGRONOMY

Agronomy is the science of the Field and its crops. It treats of Farm Management, the application of economic business methods to farm practices; Field Crops, their classification, production and improvement; Soils, their fertility, cultivation and improvement; and Agricultural Engineering, the tools, machinery, fences and drains of the farm. The Department of Agronomy consists of the three co-ordinate Departments, Farm Crops, Agricultural Engineering and Soils.

COURSE IN AGRONOMY

For Freshman year, see Agricultural Courses, page 65. All agricultural students will take the same work until the beginning of the Sophomore Year.

Sophomore Year.

FIRST SEMESTER.

Required
Semester Hours

Agricultural Engineering 4,	Farm Engineering	4
Farm Crops 3,	Corn Breeding and Judging	2
Animal Husbandry 3,	Breed Types of Cattle and Sheep	4
Horticulture 3,	Orcharding	3
Agricultural Chemistry 21,	Elementary Experimental Chem-	
	istry	5
English 12,	Argumentation	2
Military 3, or Athletics		..
		—
	Total semester hours	20

SECOND SEMESTER.

		Required Semester Hours
Agricultural Engineering 5,	Farm Machinery and Farm Motors 3	
Farm Crops 4,	Grain Breeding and Judging 2	
Animal Husbandry 4,	Breed Types of Dairy Cattle, Horses and Swine 4	
Zoology 16,	General Zoology 5	
Agricultural Chemistry 23,	Elementary Experimental Chem- istry 5	
Military 4, or Athletics	..	
	<hr/>	
	Total semester hours	19

Junior Year.

FIRST SEMESTER.

		Required	
		Semester	Hours
Soils 1,	Soil Physics	5	5
Agricultural* Chemistry 25,	Agricultural Analysis	4	4
Animal Husbandry 21,	Principles of Breeding	2	2
Choice {	Zoology 4,	4	or 5
	Mathematics 8,		
	Entomology 4		
	Analytical Geometry 5		
Students who elect Mathematics 8 will be required to take Mathematics 9 and Physics 404.			
Economic Science 9,	Outlines of Economics	3	3
		—	—
		18	or 19

Elective

The Student will select from the list of electives on page 111 enough work to make a total of from 18 to 20 hours per week.

	0 to 2
	<hr/>
Total semester hours	18 to 20

SECOND SEMESTER.

		Required Semester Hours
Soils 2,	Soil Fertility 5	5
Choice { Farm Crops 9,	Research Work 3	3
{ Agricultural Engineering 9,	Research Work 3	
{ Soils 3,	Research Work 3	
Botany 40,	General Bacteriology 2	2

Choice	Botany 11,	Vegetable Physiology 4	4 or 5
	Mathematics 9,	Calculus 5	

Students who elect Mathematics 8 in first semester Junior must elect Mathematics 9.

— —
14 15

Elective

The Student will select from the list of electives on page 111 enough work to make a total of from 16 to 20 hours per week.

2 to 6

— —
Total semester hours 16 to 20

Senior Year.

FIRST SEMESTER.

Required
Semester Hours

Choice	Farm Crops 8,	Farm Management	3
	Soils 4,	Research Work 3	3
	Agricultural	Research Work 3	
	Engineering 10,	Research Work 3	
	Farm Crops 9,	Animal Nutrition and Packing	2
	Animal Husbandry 9,	House By-Products	3
	Botany 5,	Vegetable Pathology	—
			11

Elective

The Student will select from the list of electives on page 111 enough work to make a total of from 16 to 20 hours per week.

5 to 9

— —
Total semester hours 16 to 20

SECOND SEMESTER.

Required
Semester Hours

Choice	Agricultural	Thesis 3	3 or 5
	Engineering 11,	Thesis 5	
	Agricultural	Thesis 3	
	Engineering 12,	Thesis 5	
	Farm Crops 15,	Thesis 3	
	Farm Crops 16,	Thesis 5	
	Soils 11,	Thesis 3	
	Soils 12,	Thesis 5	



FARM CROPS LABORATORY

Choice	Horticulture 4,	Plant Breeding	3	} 4 or 5
	and			
	Botany 24,	Embryogeny	1	
	Physics 404,	Electricity, Magnetism, Light and Sound	5	
Students who elect Mathematics 8 and 9 will take Physics				
404.				
				7 to 10

Elective

The Student will select from the list of electives on page 111 enough work to make a total of from 16 to 20 hours per week.

9 to 13

Total semester hours 16 to 20

FARM CROPS DEPARTMENT.

M. L. BOWMAN, ASSOCIATE PROFESSOR IN CHARGE OF DEPARTMENT.

H. G. BELL, INSTRUCTOR IN FARM CROPS.

B. W. CROSSLEY, INSTRUCTOR IN FARM CROPS.

M. L. MOSHER, EXTENSION WORK.

JAMES A. KING, EXTENSION WORK.

The new equipment installed in the Farm Crops Department enables it to give most efficient work in all of its courses. There has been installed a new chemical laboratory which is for the special use of advanced students and post graduate students which offers special inducement to students desiring to fit themselves for college or experimental work.

The grain laboratory situated on the second floor of the stock and grain judging pavilion has been supplied with the most modern equipment, making it the best and most completely equipped laboratory of its kind.

The demand for competent men trained along farm crops lines is rapidly increasing. Farm managers are especially needed to fill positions on both large and medium sized tracts of land, at good salaries. Likewise men well trained along the line of farm crops are constantly in demand by large seed establishments and by the agricultural press. It is the purpose of the Farm Crops Department to help students fit themselves along these practical lines. The following courses are offered:

WINTER COURSES IN CORN AND GRAIN JUDGING.

January 4, 1909 to January 16, 1909.

A short course in corn and grain judging has been established in order to meet the demand for instruction in this work. This course begins January 4, 1909, and continues two weeks.

Instruction will be given in the methods of selecting, testing, and preparing seed for planting; in the methods of cultivation; and the characteristics and adaptability of different varieties of corn to various sections of the state. A comparison of corn cultivators, and of planter tests with both rotary and edge-drop planters will be made.

This course is especially planned for the farmer who cannot take advantage of the work of the regular College course. Those wishing to become corn judges qualified to judge corn at farmers' institutes, fairs, and expositions will have an opportunity at this corn school to fit themselves for this work.

Samples of all the leading varieties of corn grown in Iowa will be on exhibition and will be used for judging purposes. A fire proof two-story stock and grain judging pavilion has been erected for this work. An examination will be held at the close of the school, and corn judging certificates will be issued, by the Iowa Corn Growers' Association, to those who prove themselves proficient.

*The equipment of the Grain Judging Pavilion, which has been installed at a cost of \$3,000, offers excellent facilities for small grain judging. The study of commercial grading of wheat, oats, barley and rye is also given careful attention. This work is taken up on a basis that is very similar to the grading practiced in the Chicago markets.

To partially cover the expense of additional instructors and facilities for judging, a tuition fee of \$3.00 to residents and \$5.00 to non-residents will be charged, the one fee covering the instruction in either grain and stock judging, or in grain judging and horticulture. The work during the course will be so arranged that the students' time will be equally divided between either grain and stock judging, or grain judging and horticulture.

METEOROLOGY AND CLIMATOLOGY.

The object of the course is to give the student a knowledge of the fundamental principles which govern weather and climate. The first half of the term is devoted to a study of the elementary principles of meteorology. The student is acquainted with the instruments used by the weather bureau, the principles upon which they are based, and their care and uses are explained. The last half of the term is given to a consideration of the fundamental principles which control weather and climate. Throughout the entire course the charts and maps issued by the state and federal weather bureaus are used freely. The student is given practice on the construction and interpretation of charts and in forecasting. See write-up under Geology.

COURSES IN FARM CROPS.

1. **Corn Growing and Judging.** Required first semester Freshman in all Agricultural courses. Includes study of methods of selecting,

testing, grading, planting, cultivating, harvesting and storing of corn, corn judging, commercial handling of corn, cost of production and uses of crop, the different conditions affecting the stand and quality of crop as studied in class room and under field conditions. Study is made of the different types of corn, including the kernels, ears and groups of ears, together with practice in selecting, germinating and grading corn and in calibrating the planter. Three hours credit. Recitations, two hours, and laboratory, two hours per week. Fee, \$1.50.

2. Small Grains, Grasses, and Forage Crops. Required second semester Freshman in all Agricultural courses. Includes study of grains and other field crops; their adaptation to soil and climate, conditions affecting growth, methods of culture, principles underlying reproduction, germination, plant growth and improvement; also score card practice in small grains. Three hours credit. Recitations, two hours and laboratory, two hours per week. Fee, \$1.50.

3. Corn Breeding and Judging. Required first semester Sophomore in Agronomy course and elective Junior or Senior year in all other agricultural courses. Includes a detailed study of all the leading varieties of corn, their origin, history and adaptation to the different localities. Also a careful study of the best methods to be employed in the improvement of corn by selection and breeding. Corn judging will be a special feature of the work. The distinguishing characteristics of the different varieties of corn will be given careful attention. Two hours credit. Laboratory and lectures, four hours per week. Fee, \$2.00.

4. Grain Breeding and Judging. Required second semester Sophomore in the Agronomy course and elective Junior or Senior year in all other agricultural courses. Includes a detailed study of all the leading varieties of small grains, their origin, history and adaptation to the different localities, also a careful study of the best methods to be employed in their improvement. Grain judging will be one of the chief features of the work, together with a study of the weed seeds found in the commercial grades of these grains. The distinguishing characteristics of the different varieties will be studied, also the uses to which the small grains are put. Two hours credit. Laboratory and lectures, four hours per week. Fee, \$2.00.

8. Farm Management. Required first semester Senior year in Agronomy, elective first semester Junior or Senior year in all other agricultural courses. This course includes the study of the different systems of extensive and mixed farming, problems confronting the farmer, circumstances influencing agricultural practices, the hired help, fencing, live stock and a study of the methods pursued by our most successful farmers. A practical and thorough study of farm accounts is made a special feature. The extensive coöperation which the Farm Crops Department is having along the line of farm management with a large number of the best farmers of the state helps

to make this a most practical course in systematizing the general farm practices. Three hours credit. Fee, \$2.00.

9. Research Work in Farm Crops. Required second semester Junior, or first semester Senior in Agronomy by those students who do not elect research work in Agricultural Engineering or Soils. Original experimentation and study of special problems relating to cereal, forage, root and other crops. Experiments may be conducted in greenhouse or field. Includes the testing of vitality, purity of seeds, pollination and diseases of grains and their treatment. Prerequisites, Farm Crops 1 and 2. Three hours credit. Laboratory, six hours per week. Fee, \$2.00.

10. Advanced Research Work in Farm Crops. Elective either semester, Junior or Senior year, in all Agricultural Courses. Original investigation in the chemistry of various field crops, including composition of the cereals and forage crops subject to different conditions and other questions treating upon the economic production and use of farm crops. Especially equipped Farm Crops Chemical Laboratory furnishes excellent facilities for this work. This course offers special advantages for thesis work. Three hours credit. Laboratory, six hours per week. Fee, \$5.00.

11. Advanced Corn Judging. Elective first semester Junior or Senior year in all Agricultural Courses. Intended to fit students more thoroughly to become competent corn judges at institutes and fairs or specialists in corn production. The time is devoted entirely to the judging of corn. All the leading varieties are given special consideration. Prerequisite, Farm Crops 3. Three hours credit. Laboratory, six hours per week. Fee, \$2.50.

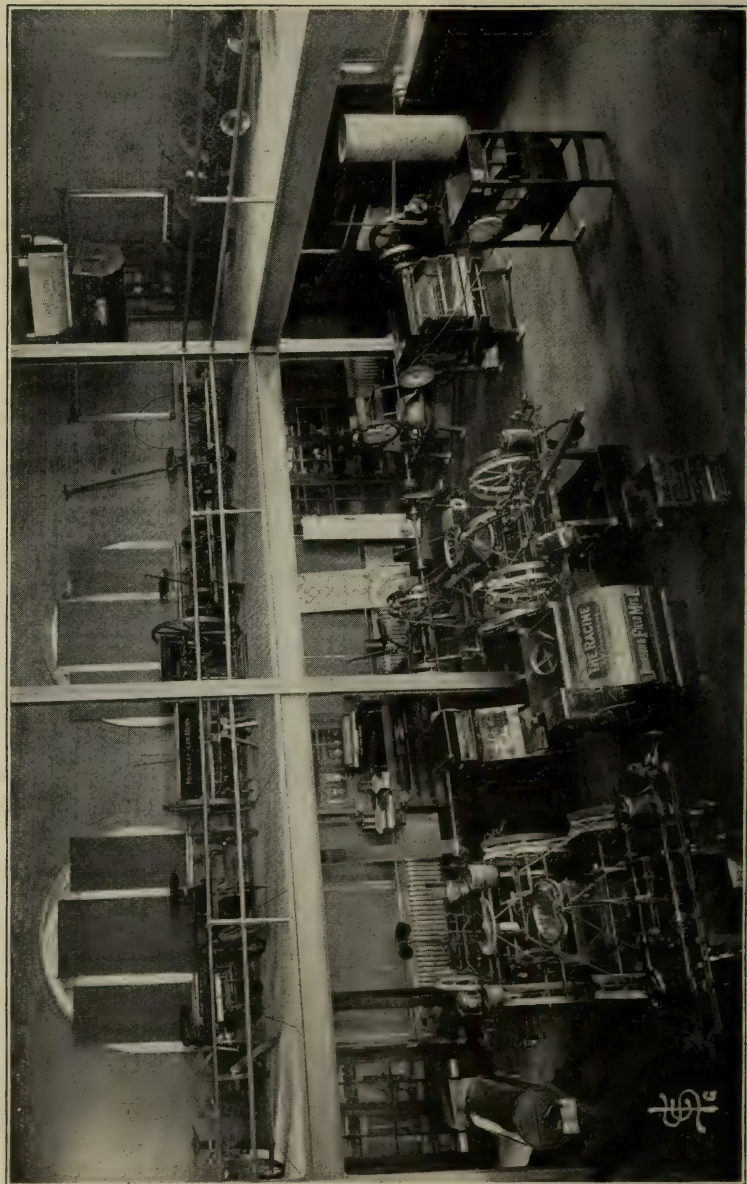
12. Advanced Grain Judging. Elective second semester, Junior or Senior year in all Agricultural Courses. This course is intended to fit students more thoroughly to become competent grain judges and to fill positions as grain inspectors. The work in the grading of grain will be practically the same as that carried on by the Chicago Board of Trade, and supplies an excellent opportunity for students desiring to make special study along these lines. Together with the smaller cereals, the commercial grading of corn will also receive attention. Prerequisite, Farm Crops 4. Two hours credit. Laboratory, 4 hours per week. Fee, \$2.50.

15. Thesis. Required second semester Senior year in Agronomy. Must be upon some subject requiring original work in Farm Crops. Three hours credit.

16. Thesis. Same as Farm Crops 15 except five hours credit.

GRADUATE WORK IN FARM CROPS.

Post graduate work may be taken in advanced grain judging. This consists of original investigations of any farm crop or crops, they being treated from both the scientific and practical standpoint. This work is



AGRICULTURAL ENGINEERING EQUIPMENT

designed to train students to hold positions with seed firms, in agricultural experimental work, along special seed or crop lines in the United States Department of Agriculture, or to still further prepare them to solve the complex problems of the farm. Having access to the fields and to the excellent laboratory facilities which are offered, post graduates may obtain a very thorough course from both the scientific and practical standpoint.

COMMERCIAL JUDGING AND GRADING OF GRAINS.

An opportunity for study along the lines of commercial judging and grading of grains is also offered, thus preparing graduates for positions as grain inspectors. A graduate of any institution who has not had the equivalent of the work offered in the previous courses in Farm Crops, will be given an opportunity for taking a special course in judging and grading cereals and forage crops. A student pursuing advanced work in the commercial grading of grains must have six weeks training under an efficient inspector at an important grain center before completing the course.

DEPARTMENT OF AGRICULTURAL ENGINEERING.

J. B. DAVIDSON, PROFESSOR.

E. W. HAMILTON, INSTRUCTOR.

J. T. HOOVER, ASSISTANT.

R. E. CARR, ASSISTANT.

The development of modern agricultural machinery, the increase in the size and importance of farm structures, the improvement of land by drainage and its reclamation by irrigation and the need of better roads, demand that the successful farmer of today must be trained along mechanical and engineering lines. To supply this training and to investigate problems related thereto is the work of the Department of Agricultural Engineering.

It is believed that this department has the most complete equipment of any similar department in existence. It is at present housed in Agricultural Engineering Hall, a fire proof building to the rear of Agricultural Hall. Upon the completion of New Agricultural Hall additional room in the older building will be provided the department.

Some of the features of the equipment are as follows: The laboratories contain over twenty thousand dollars worth of farm machinery. Surveying instruments are provided sufficient to equip fourteen field parties. The Forge shop is equipped with twenty Buffalo down draft forges and individual tool sets together with a complete set of special tools, a press drill and grinder. The carpenter shop has benches and

tool sets for thirty students and a miscellaneous tool equipment is provided in the tool room. This shop is also provided with a power cross cut and rip saw, a planer and two speed lathes.

The experimentalist is provided with a separate laboratory and devotes his entire time to research. This laboratory has many special instruments in the way of dynamometers, indicators, and testing machines, and also a tool equipment including a fourteen-inch engine lathe.

The work of the department is principally that of giving instruction to those who intend to make the farm the object of their life work; however, the demand for instructors and others trained along these lines requires the department to offer special instruction to meet this demand. Students specializing may select such studies from the Engineering Division as will meet the approval of the Deans of the two divisions and the heads of the departments concerned.

COURSES IN AGRICULTURAL ENGINEERING.

1. Shop Work. Required either first or second semester of the Freshman year in the Agricultural course. Blacksmithing, forging and welding of iron and steel, and making and tempering hand-tools. Work designed to be especially helpful in the repair and operation of machinery. Two hours credit. Four hours per week. Fee, \$2.50.

2. Shop Work. Required either first or second semester of the Freshman year in the Agricultural course. Carpentry, care, use and sharpening of tools, laying off work, making of joints and framing. Work designed to be especially helpful in the planning, framing, and construction of farm buildings. Two hours credit. Four hours per week. Fee, \$2.50.

3. Farm Blacksmithing and Horse Shoeing. Elective first semester, Junior or Senior year in all Agricultural courses. An advanced course in blacksmithing. Two hours credit. Laboratory, four hours per week. Fee, \$2.50.

4. Farm Engineering. Required first semester Sophomore year in Agronomy, Animal Husbandry, Horticulture and Science and Agriculture, and elective in Dairy course. Includes instruction in agricultural surveying, also a study of location of drainage districts, drainage laws, and best systems of drainage; location and construction of roads; the building of fences and concrete construction in farm work; also drawing, including lettering, map making, planning of drainage systems and road profiles; and field work, including care, adjustment and practice in the use of surveying instruments. Prerequisite, Mathematics 17. Four hours credit. Recitation, two hours and laboratory, four hours per week. Fee, \$2.00.

5. Farm Machinery and Farm Motors. Required second semester Sophomore year in Agronomy and Animal Husbandry, and elective

second semester Junior or Senior in all other Agricultural courses. Includes a brief study of mechanics and materials; a study of the development, construction, functions and methods of operating, adjusting and repairing implements and machinery; also the study of the principles of draft and the production of power. Laboratory work devoted to the comparative analysis and testing the machines discussed in the class room. Three hours credit. Recitations, two hours and laboratory, two hours Fee, \$2.00.

6. Rural Architecture. Elective second semester Junior or Senior year in all Agricultural courses. Embraces the planning of all farm buildings, a study of their construction, lighting, ventilation, cost, convenience, also testing the strength of building materials, and making of plans and specifications. Prerequisite, Agricultural Engineering 4. Three hours credit. Recitation, one hour and laboratory, four hours per week.

7. Dairy Engineering. Required first semester Sophomore year in Dairying and first semester of One Year Dairy Course, elective first semester Junior or Senior year in all other Agricultural courses. Special work in the management, care and operation of steam and gasoline engines. Two hours credit. Recitation, one hour and laboratory, two hours per week. Fee, \$2.00.

8. Spraying Apparatus. Required second semester Sophomore year in Horticulture. Elective in second semester Junior or Senior year of all other Agricultural courses. Precedes Field Practice in Horticulture 7 in the same semester. A brief study of the mechanics, of pumps, also the care, operation and repair of spraying apparatus. One hour credit. Recitation, one hour and laboratory, two hours per week for one-half semester. Fee, \$1.00.

9. Research Work in Agricultural Engineering. Required second semester Junior year in Agronomy by all students who do not elect research work in Soils or Farm Crops. The large equipment of machinery and instruments in this department offers to the student a wide range of subjects for research work, as Drainage, Farm Water Supply, Sewerage, Road Construction, Fences, Use of Cement on the Farm, Testing and Calibrating various Farm Machines. Traction tests. Prerequisites, Agricultural Engineering 4 and 5. Three hours credit. Fee, \$2.00.

10. Research Work in Agricultural Engineering. Required first semester Senior year in Agronomy by all students who do not elect research work in Soils or Farm Crops. Work same as in 9. Prerequisites, Agricultural Engineering 4 and 5. Three hours credit. Fee, \$2.00.

11. Thesis. Required second semester Senior year in Agronomy. Must be upon some subject requiring original work taken in Farm Crops, Agricultural Engineering or Soils. Three hours credit.

12. Thesis. Same as Agricultural Engineering 11 except five hours credit.

Post Graduate Work in Agricultural Engineering.

Students may take up graduate work along any of the many lines of Agricultural Engineering. This training will prepare them for government positions in agricultural engineering lines, for teaching in Agricultural colleges, or for becoming managers or superintendents of farms. Investigation may be carried on along any special line which they are fitted to pursue. The following subjects are suggested: (A) Irrigation, studying the principles employed and the machinery used and its efficiency, also practical work in sewage irrigation on the College Farm; (B) Farm Architecture, the locating, designing, constructing, drawing up specifications and contracts, and estimating cost of all farm buildings; (C) Road Construction, thus fitting students for becoming highway engineers; (D) Investigation of Farm Implements, their construction and efficiency, also comparison of different makes. The department, having an equipment of \$20,000.00 worth of modern implements, offers splendid opportunities for this line of investigation; (E) Farm Motors, the efficiency of steam traction and gasoline engines, also a comparison with the horse as power; and (F) Drainage, thus fitting students as drainage engineers. The co-operative experiments of this department with the United States Department of Irrigation and Drainage Investigation, furnish a good opportunity for study along this line.

DEPARTMENT OF SOILS.

WILLIAM HENRY STEVENSON, PROFESSOR.

JOSEPH F. BARKER, INSTRUCTOR.

A. H. SNYDER, EXTENSION WORK.

On the first floor of Agricultural Hall, a commodious and well appointed soil laboratory accommodating seventy-five students has been thoroughly equipped for accurate and scientific work.

Over three thousand dollars have been expended for new soil apparatus, thus affording unsurpassed facilities for regular, advanced and graduate students in soils. The desks, hoods and balance rooms are of latest design; the desk apparatus for individual work is complete. Each desk is supplied with water, gas, steam, and compressed air. The centrifuge, shaker and other pieces of soil apparatus are run by individual motors.

The department also has two large rooms in the new greenhouse, which are devoted to pot culture work and various lines of soil experimental work. Plots on the Station farm are available for class and experimental work.



THE SOILS LABORATORY

COURSES IN SOILS.

1. Soil Physics. Required first semester Sophomore year in Horticulture, and first semester Junior year in Agronomy, Animal Husbandry, and Science and Agriculture, elective Junior or Senior year in Dairy course. This course comprises a study of the origin, formation and classification of soils; soil moisture and methods of conserving it; soil temperature, and conditions influencing it; soil texture as affecting heat, moisture and plant food; surface tension, capillarity, osmosis, and diffusion as affecting soil conditions; the effect upon the soil and the crop of plowing, harrowing, cultivating, cropping, and rolling; washing of soils and methods of preventing the same; preparation of seed beds; cultivation and drainage as affecting moisture, temperature, root development and the supply of available plant food. Special attention will be given to the mechanical analysis of soils by the centrifuge method. The work also comprises the determination of the specific gravity, apparent specific gravity, volume, weight, porosity, water-holding capacity, and capillary power of various soils; also a study of the effect of mulches on the evaporation of water from the soil and the physical effects upon the soil of different systems of rotations and of continuous cropping. Five hours credit. Recitations, three hours and laboratory, four hours per week. Fee, \$3.00.

2. Soil Fertility. Required second semester Junior year in Agronomy, Animal Husbandry, Horticulture, and Science and Agriculture and elective Junior or Senior year in Dairy course. Maintenance of Fertility; Fertilizers and Rotations. The influence of commercial fertilizers, barnyard manure, and green manuring upon the quality and yield of various crops; the effect of different crops upon the fertility of the soil and upon succeeding crops; different systems of rotation and the effect upon the productiveness of the soil of various methods of soil management; also a study of the storing, preserving, and application of farmyard manure.

This work is supplemented by a study of manures, fertilizers and soils; their composition and agricultural value. Pot and field experiments are conducted to show the influence of fertilizers, applied to the soil in different quantities and at different times, upon the quality and yield of various crops. Leguminous crops as fertilizers and their place in crop rotation. A study is made of special types of soil in different sections of the state, such as clay, gumbo, loess, and peat with special reference to the best methods of handling and cropping these soils. Prerequisites, Soils 1, and Chemistry 25. Five hours credit. Recitation, three hours and laboratory, four hours per week. Fee, \$5.00.

3. Research Work in Soil Physics. Required second semester Junior year in Agronomy for all students who do not elect research work in Farm Crops or Agricultural Engineering. Original research

work in soil physics. Three hours credit. Three laboratory periods per week. Fee, \$2.00.

4. Research Work in Soil Fertility. Required first semester Senior year in Agronomy for all students who do not elect research work in Farm Crops or Agricultural Engineering. Original investigations in soil fertility. Three hours credit. Laboratory, six hours per week. Fee, \$2.00.

5. Advanced Soil Physics. Elective second semester Junior or Senior year in all Agricultural courses. Students who take this course are also required to take Soils 10. Study of the physical properties of soils; the determination of the temperature, moisture and soluble salt content of various soils under field conditions; green house, laboratory and field experiments to study the effect upon soil conditions of different methods of soil management, also a study of the soils of the United States; their location, classification and relation to crop production. This course is also intended for students wishing to make a study of soil surveying and mapping. Prerequisite, Soils 1. Two hours credit. Laboratory, four hours per week. Fee, \$2.00.

6. Advanced Soil Fertility. Elective first semester Senior year in all Agricultural courses. Soils 9 is required of students classified in this course. Study of the fertility and productiveness of particular types or classes of soils; the nature and quantity of the elements of fertility in soils; the effect of fertilizers added to the soil upon the growth and yield of various crops as determined by pot cultures and experiments; also includes lectures and assigned readings, study of results of previous investigations, and written report of results of experiments and investigations made by the student. Prerequisites, Soils 1 and 2. Two hours credit. Recitation, one hour; laboratory, two hours per week. Fee, \$2.00.

7. Investigation of Special Soils. Elective second semester Senior year in all Agricultural courses. Students who take this course are also required to take Soils 10. This course is designed to enable the student to study one or more types of soil in which he may be particularly interested and to become familiar with correct principles and methods of soil management. Two hours credit. Recitation, one hour. Laboratory, two hours per week. Fee, \$2.00.

8. Soil Bacteriology. Elective second semester Junior or Senior year in all Agricultural courses. A study of those organisms found principally in the soil, including a study of the decomposition of nitrogenous and carbonaceous matter; nitrification, denitrification and the assimilation of atmospheric nitrogen, thus furnishing the student with a knowledge of the relation of bacteria to the soil and to plant growth. Prerequisites, a knowledge of chemistry and general bacteriology. Three hours credit. Lecture, one hour, and laboratory, four hours per week. Fee, \$4.00.

9. Soil Seminar. Required first semester Senior year of students classified in Advanced Soil Fertility, (Soils 6). Consists of the presentation and discussion of data concerning the soils of the United States with special reference to their physical and chemical characteristics and relation to crop production. One hour credit. One hour per week.

10. Soil Seminar. Required second semester Senior year of students classified in Advanced Soil Physics (Soils 5); Investigation of Special Soils (Soils 7) or Thesis (Soils 11 or 12). Consists of preparation, presentation and discussion of papers upon special assigned topics in Soils. The papers must be carefully written and submitted to the professor in charge. One hour credit. One hour per week.

11. Thesis. Required second semester Senior in Agronomy. Students who take this course are also required to take Soils 10. Must be upon some subject requiring original investigation, taken in Farm Crops, Agricultural Engineering or Soils. Three hours credit.

12. Thesis. Same as Soils 11, except has five hours credit. Students who take this course are also required to take Soils 10.

Graduate Work in Soils

Post graduate work is offered in Soils which prepares the student for special work in the United States Bureau of Soils or in Colleges and State Experiment Stations. The work may be taken in either Soil Physics or Soil Fertility as a continuation of work taken as an undergraduate in this college or of any line of soil study which has fitted the student to pursue advanced work.

The graduate student will find excellent opportunities for investigations in soils along any of the following lines:

(A) The relation of soil types to crop production; (B) Soil types; methods of surveying and mapping; (C) The management of certain types of soil to improve their physical condition; (D) The mechanical composition of soils; Its influence upon the physical properties affecting crop production; (E) Erosion of soils and methods of prevention; (F) The relation of farm manures, fertilizing materials and crop rotations to the maintenance of fertility; (G) Pot culture, bottle and wire basket investigations to determine the manurial requirements of soils; (H) The comparative value of important types of soils based upon their composition; (J) Methods of investigating the soils of a state; (K) Methods of rendering more productive certain types of soil such as sandy, peaty and loess soils; (L) The relation of the organic matter content of soils to crop yields with special reference to the changes which take place in the plant food content and in the physical condition of the soil; (M) The soils of the United States with special reference to crop adaptation.

The graduate student is not limited to these lines of investigation; he may work on any subject which meets the approval of the head of the department.

DEPARTMENT OF DAIRYING

G. L. MC KAY, PROFESSOR.

F. W. BOUSKA, ASSOCIATE PROFESSOR, DAIRY BACTERIOLOGIST.

JOHN BOWER, ASSISTANT PROFESSOR.

HERMAN HORNEMAN, INSTRUCTOR.

A. H. CHADSEY, REFRIGERATION ENGINEER.

The work of the Dairy Department is that of giving instruction and training to fit men for the various callings in dairying, of Experimentation and the investigation and discovery of facts relating to this industry.

Owing to the rapid progress and the application of scientific principles to the dairy industry, it is necessary that those engaged in this work should keep in touch with new ideas and principles. In order to meet this demand, the dairy department offers first, a four year course for qualifying students to become competent teachers and investigators of dairying in agricultural colleges and experiment stations, inspectors of dairy products and creameries in municipal, state and government service, or superintendents of large creameries or dairy farms; second, one year course, for fitting students for becoming operators of creameries, cheese factories, and dairy farms; and third, a two weeks' short course, for acquainting experienced dairy and creamery men with new methods and investigations which they cannot learn in their own factories.

The Dairy Department with its new building and the Dairy farm with its herd, offer unexcelled facilities for teaching Dairying in a thoroughly practical and scientific manner. The dairy farm of 200 acres, is well stocked with various types and breeds of milk cows. The milk from this herd together with the milk and cream shipped and hauled to the college supplies all the needs of the creamery.

The Dairy Building is a practical working creamery and cheese factory in operation throughout the year. The products made bring the highest quotations and have an enviable reputation in the markets of the United States and England.

The student becomes familiar with all the practical work connected with a commercial creamery, weighing the milk brought in by the patrons and testing the same, running the engines, caring for the factory rooms and machines, and shipping the butter. The aim is to teach not only how but why the work is so done. During the senior year, the students who have proven themselves capable, do original research work in the laboratory, the results of which if of value to others are reported in the bulletins of the Experiment Station.

The studies other than dairying offered in this course are such as give the student a knowledge of the scientific principles upon which this work depends and a broad and general education.

Students in all the dairy work are required to provide themselves with white suits, keep them clean and in good order.



WINTER COURSE IN DAIRYING

(January 4, 1909, to January 16, 1909).

The prominent rank attained by students of the Iowa Dairy School in state and national contests has led to a demand for special instruction. A course in Butter Making and one in Farm Dairying are now offered during the winter in order to meet this demand.

In the course in Butter Making, special attention will be paid to the handling of hand separator cream so as to make the best grade of butter possible, the proper controlling of moisture and salt in butter, the removal of undesirable flavors from cream, the preparation of starters, the pasteurization of cream, and the analysis of butter.

This course is intended especially for experienced butter makers, inexperienced men not being admitted. A fee of \$12.00 is charged for admission to this course in order to cover the expenses of securing extra instructors and of the materials used.

The course in Farm Dairying is especially intended for farmers, farmers' wives and daughters who are interested in improving the quality of dairy butter. The instruction given will include the care and testing of both milk and cream, best methods of manufacturing butter on the farm, and the construction and care of the hand separator. A fee of \$2.00 is charged for admission to this course.

COURSE IN DAIRYING.

For Freshman year, see Agricultural Course, page 65. All Agricultural students will take the same work until the beginning of the Sophomore year.

Sophomore Year.**FIRST SEMESTER.**

		Required semester hours
Agricultural Engineering 7,	Dairy Engineering	2
Animal Husbandry 3,	Breed Types of Cattle and Sheep	4
Horticulture 3,	Orcharding	3
Agricultural Chemistry 21,	Elementary Experimental Chem- istry	5
English 12,	Argumentation	2
Economic Science 9,	Outlines of Economics	3
Military 3, or Athletics,		—
	Total semester hours	19

SECOND SEMESTER.

		Required semester hours
Dairying 11,	Cheese Making	4
Dairying 13,	Milk Testing and Milk Inspection	2
Animal Husbandry 4,	Breed Types of Dairy Cattle, Horses and Swine	4
Agricultural Chemistry 23,	Elementary Experimental Chem- istry	5
Choice {	Economic Science 10,	3 } 3
	History 6,	
	French Revolution and XIXth Century	
Military 4, or Athletics,		—
	Total semester hours	18

Junior Year.

FIRST SEMESTER.

		Required semester hours
Dairying 14,	Advanced Butter Making	4
Animal Husbandry 21,	Principles of Breeding	2
Agricultural Chemistry 25,	Agricultural Analysis	4
		—
		10

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week

6 to 10

Total semester hours

16 to 20

SECOND SEMESTER.

		Required semester hours
Dairying 16,	Technology of Milk	1
Dairying 24,	Fancy Cheese Making	3
Botany 40,	General Bacteriology	2
Agricultural Chemistry 26,	Agricultural Analysis	4
		—
		10

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week

6 to 10

Total semester hours

16 to 20

Senior Year.**FIRST SEMESTER.**Required semester
hours

Dairying 17,	Dairy Bacteriology	4
Dairying 18,	Scoring Butter and Cheese	1
Dairying 19,	Seminar Work	2
Animal Husbandry 9,	Animal Nutrition and Packing	
	House By-Products	2
Veterinary 44,	Sanitary Science	2
		—
		11

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week

5 to 9

Total semester hours

16 to 20

SECOND SEMESTER.Required semester
hours

Dairying 20,	Factory Management	3
Dairying 21,	Preparation of Ice Cream and	
	Ices	1
Dairying 23,	Thesis	2
Animal Husbandry 15,	Milk Production	1
		—
		7

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week

9 to 13

Total semester hours

16 to 20

COURSES IN DAIRYING

1. Dairy Practice. Required the first and second semester in one year Dairy Course. The first semester, practical work in cheese making, the second, in butter making. From five to seven hours in practical laboratory work per day.

2. Buttermaking. Required the second semester in one year Dairy Course. It includes a study of the composition of milk and dairy products, the principles of gravity and centrifugal separation of cream,

cream ripening, preparation of starters, churning, and preparation of butter for market. Sixteen lectures per semester.

3. Milk Testing. Required the second semester in the one year Dairy Course. A study of the Babcock test, and of the Farrington and Manns' test for determining acidity, the use of the lactometer for detecting adulterations, and also the composite sampling and testing of individual cows. One hour credit.

5. Bookkeeping. Required the second semester of the one year Dairy Course. Study of the best form of bookkeeping for the factory business. One hour credit.

6. Dairy Bacteriology. Required the first semester of the one year Dairy Course. Application of the principles of bacteriology in the care of milk, and in butter and cheese making. One lecture per week.

8. Cheesemaking. Required the first semester of the one year dairy course. A study of the importance of the quality and composition of milk in the manufacture of Cheddar Cheese; the principles involved in cutting, heating, milling, salting and pressing the curd, curing and marketing; influence of organized and unorganized ferments in cheese; and the construction and ventilation of cheese curing rooms. Sixteen lectures per semester. Work in cheese factory once a week.

For the above courses, all of which are offered in the one year Dairy Course, a fee of \$10.00 per semester is charged.

10. Domestic Dairying. Elective in second semester Junior or Senior years in Domestic Economy, and all Agricultural Courses. Study of those dairy subjects that interest the housekeeper and dietetist. The important topics are: The nutritive and economic value of milk; its dietetics and hygiene; market milk, infants' milk, invalids' milk, cream, ice cream, condensed milk, milk chocolates, malted milk, dried milk, fermented milks (Kephir, Koumissete), buttermilk, butter, and cheese. Demonstrations are given in types of butter and cheese and in testing the purity of milk and butter. Two lectures per week. Fee, \$2.00.

11. Cheese Making. Required the second semester of the Sophomore year in the Dairy Course and elective the second semester of the Junior or Senior year in all other Agricultural courses. A study of the importance of the quality and composition of milk in the manufacture of Cheddar cheese; the principles involved in cutting, heating, milling, salting and pressing the curd, curing and marketing; influence of organized and unorganized ferments in cheese; and the construction and ventilation of cheese curing rooms. Four hours credit. Recitation, one hour and laboratory, six hours per week. Fee, \$3.00.

12. Farm Dairying. Required the second semester of the Freshman year in the Agricultural Course. Includes a general study of the secretion, composition, testing, separation and acidity of milk, preparation of starters, ripening of cream, and churning and packing butter.

Three hours credit. Recitations, two hours and laboratory, two hours per week. Fee, \$3.00.

13. Milk Testing and Milk Inspection. Required the second semester of the Sophomore year in the Dairy Course and elective in Junior and Senior in all other Agricultural Courses and required of Juniors in the Veterinary Course. A study of the Babcock test, Farrington's and Manns' test for determining acidity, the use of the lactometer for detecting adulteration, composite sampling, and testing of individual cows, and detection of different preservatives and adulterations. Two hours credit. Recitation, one hour, and laboratory two hours per week. Fee, \$2.50.

14. Advanced Butter Making. Required the first semester of the Junior year in the Dairy Course and elective the first semester of the Junior or Senior year in all other Agricultural Courses. A study of the physical and chemical properties, secretion and composition; separation of milk, cream ripening, the principles of churning, packing and marketing butter. Prerequisite, Agricultural Chemistry 21. Four hours credit. Recitations, two hours and laboratory four hours per week. Fee, \$3.00.

16. Technology of Milk. Required the second semester of the Junior year in the Dairy Course and elective the second semester of the Junior or Senior year in all other Agricultural Courses. A study of the utilization of milk and its products, as the preparation of condensed, modified, and milk sugar, casein, and the food value of milk and its products. Prerequisites, Agricultural Chemistry 21, 23 and 25. Recitation, one hour per week. Fee, 50 cents.

17. Dairy Bacteriology. Required the first semester of Senior year, in the Dairy Course and elective the first semester, Junior or Senior year in all other Agricultural courses. A study of the functions of bacteria and the application of bacteriological principles to dairy work. Prerequisites, Botany 40, and Chemistry 21, 23, 25 and 26. Four hours credit. Recitations, two hours and laboratory, four hours per week. Fee, \$4.00.

18. Scoring Butter and Cheese. Required the first semester of the Senior year in the Dairy Course, and the first semester of the One Year Dairy Course, and elective Junior or Senior in all other Agricultural Courses. A study of the standard market requirements for dairy products, also the examination and scoring of butter and cheese. One hour credit. Fee, \$3.00.

19. Seminar Work. Required the first semester of the Senior year in the Dairy Course. A study of various authorities on Dairying together with the work of the experiment stations on this subject. Prerequisites, Botany 40, Dairying 11 and 14. A knowledge of French and German is recommended. Two hours per week.

20. Factory Management. Required the second semester of the Senior year in the Dairy Course and the second semester of the One Year Dairy Course and elective Junior or Senior in all other Agricultural

courses. Consists of the location, organization, construction, drainage, and ventilation of factories, the treatment of the by-products, and creamery refrigeration, thus qualifying a student to superintend or manage a large factory or dairy establishment. It is advisable for students to put in the laboratory during vacation or when work can be done during consecutive days. Prerequisite, Dairy 14. Three hours credit. Lecture, one hour and laboratory, four hours per week.

21. Preparation of Ice Cream and Ices. Required the second semester of the Senior year in the Dairy Course, and elective in second semester of the Junior or Senior year of all Agricultural courses. A study of the preparation of ice cream, sherbets, and ices made on a private or commercial scale. Both lectures and laboratory. One hour credit. Fee, \$2.50.

23. Thesis. Required the second semester of the Senior year in the Dairy Course. Original work on some dairy subject. May be worked out in co-operation with the departments of chemistry or bacteriology. Students should consult the professor concerning their subject at or before the beginning of their Senior year. Two hours per week.

24. Fancy Cheese Making. Required the second semester of the Junior year in the Dairy Course, and elective Junior or Senior in all other Agricultural courses. Includes making the varieties found in the American market as Limburger, Swiss, Brick, Roquefort, Sage, Stilton, Pineapple, Gouda, Gorgonzola, and Neufchâtel. Three hours credit. Lecture, one hour and laboratory, four hours per week. Fee, \$3.00.

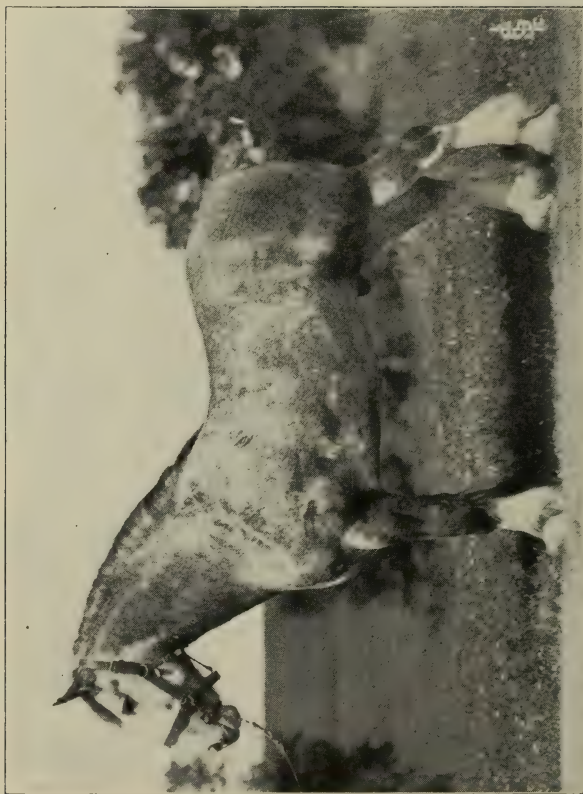
ONE YEAR COURSE IN DAIRYING.

The one year course in dairying is designed to meet the needs of those who want to acquire a knowledge of practical dairy methods as well as the scientific principles underlying the work. This course includes one college year beginning in August and ending in June. Students completing this course will be given certificates when evidence is furnished that they have successfully for one year operated a creamery or other dairy establishment.

ONE YEAR COURSE IN DAIRYING.

FIRST SEMESTER.

		Required semester hours
Dairying 1,	Dairy Practice	6
Dairying 8,	Cheese Making	1
Agricultural Engineering 7,	Dairy Engineering	2
Animal Husbandry 19,	Feeding Dairy Stock	2
Chemistry 28,	Dairy Chemistry	2
Dairying 18,	Scoring Butter and Cheese	1
Dairying 6,	Dairy Bacteriology	1
	Total semester hours	15



AN INTERNATIONAL WINNER
USED IN GOVERNMENT HORSE BREEDING WORK AT AMES

SECOND SEMESTER.

		Required semester hours
Dairying 1,	Dairy Practice	6
Dairying 2,	Butter Making	1
Dairying 3,	Milk Testing	1
Dairying 5,	Bookkeeping	1
Dairying 20,	Factory Management	1
Animal Husbandry 18,	Breeding and Judging Dairy Stock	2
Chemistry 29,	Dairy Chemistry	2
Total semester hours		14

DEPARTMENT OF ANIMAL HUSBANDRY.

W. J. KENNEDY, PROFESSOR.

WAYNE DINSMORE, ASSOCIATE PROFESSOR.

J. A. MCLEAN, ASSOCIATE PROFESSOR.

H. G. VAN PELT, ASSISTANT PROFESSOR AND SUPT. OF DAIRY FARM.

H. C. PIERCE, INSTRUCTOR IN CHARGE OF POULTRY.

E. N. WENTWORTH, ASSISTANT.

R. K. BLISS, EXTENSION WORK.

R. E. DRENNAN, EXTENSION WORK.

The department of Animal Husbandry stands for all lines of work which pertain to the judging, selecting, breeding, feeding, development, care and management of the various breeds and classes of domesticated animals. Because of the importance of the live stock industry to the welfare of the state and because of the demand for instruction in this line, the equipment for instruction has been made as complete in every detail as possible.

The herds and flocks, established at an early date have been added to from time to time until our equipment in this line, consisting of almost all recognized breeds of animals, places us in a position to do work in Animal Husbandry lines which cannot be accomplished in those institutions where such specimens are not furnished for instruction. Believing that training the eye is the only way to make a young man a proficient judge of live stock, the work of the lecture room and laboratory is demonstrated by the use of living specimens.

The two commodious judging pavilions, located near the barn, afford ample room for dividing the classes into many sections thus allowing individual work.

An excellent collection of horses representing all the market classes and the breeds of both light and heavy types is maintained for instruction purposes. Among these are good representatives of the Shires, Percherons, Clydesdales, French Coachers, Hackneys, Standard breeds,

and American Saddle Horses. Some of the horses are imported; while the others have been purchased with much care in their selection, from the best breeders on the continent.

More than two hundred head of cattle, representing all the leading beef, dual purpose, and dairy breeds are maintained on the farm. Complete breeding herds of most of the breeds are kept. An excellent collection of steers, representing the highest type of fat steer, and all the other classes and grades to be found in our leading markets down to the very lowest grades, is always available for class work. This affords our students an excellent opportunity to study the market demands and to know what constitutes each class, also why there is such a wide margin in the prices paid for cattle by the packer.

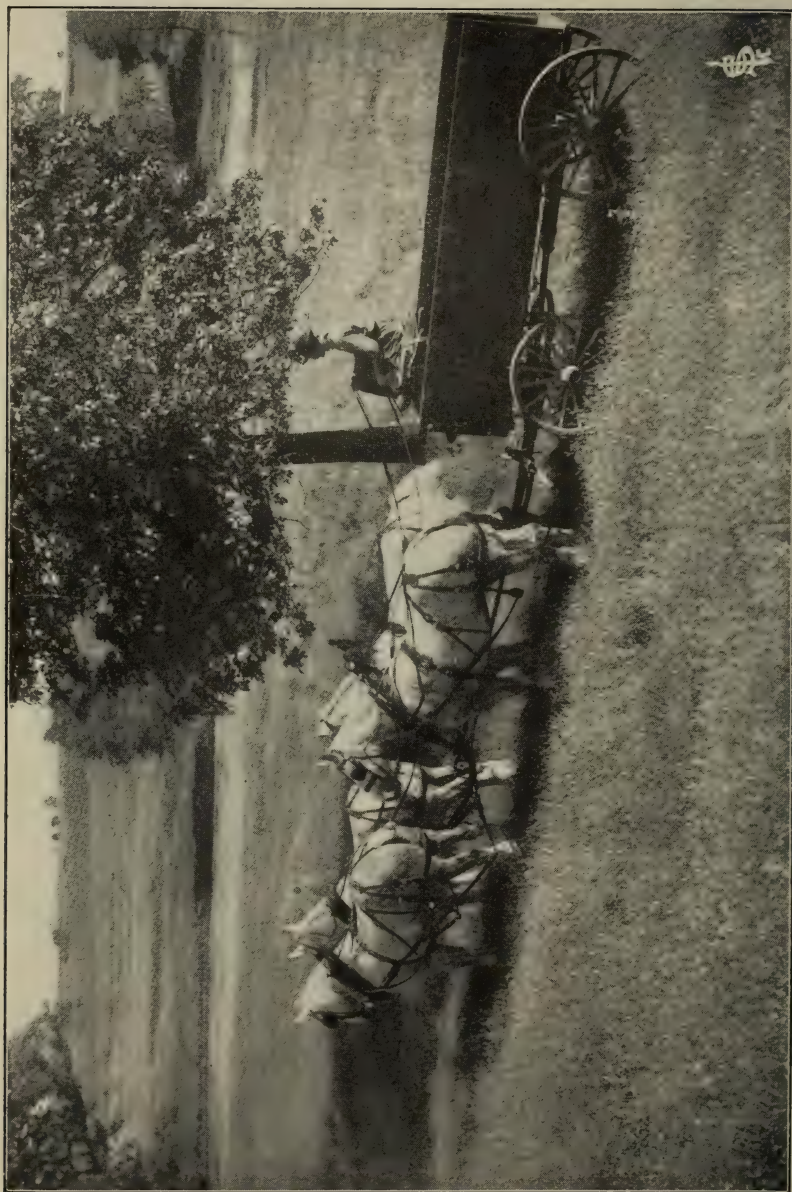
The dairy farm is well stocked with dairy cattle, including a herd of about a hundred representatives of the Holsteins, Jerseys, Guernseys, Ayrshires, milking Shorthorns, with good sires of the different breeds. This equipment affords an excellent opportunity for class work when studying the origin, history, and development of the different breeds of dairy cattle, their characteristics and the conditions under which they are evolved; also for carrying on investigations along the lines of breeding, feeding and management of the dairy herd for profit; and the relative values of home grown feed stuffs and by-products in the production of milk and butter fat.

The flocks of sheep, consisting of over 200 head of seven different breeds have been carefully selected to represent the type and characteristic of each breed both in regard to form and wool bearing qualities. In addition to the breeding flocks, the department has a choice collection of fat wethers which affords an opportunity for the student to familiarize himself with the highest type of finished mutton sheep. All these are available for class work.

In the swine department, representatives of six breeds of the best American and British varieties are maintained. As in the other departments, the aim in this has been to keep in touch with the modern ideas of leading breeders, both in regard to breeding and the type of the animals in these breeds.

At all seasons of the year there is more or less feeding of market stock being done on the farm and in connection with the Experiment Station, so that excellent material is always available for instruction purposes regarding the qualities that add to the value of stock for the ordinary market. Having pure bred representatives, it is easy to inform the student in a practical way on the finer points of color, type, and other characteristics that relate to the pure bred classes of stock.

To assist further in this work, the herd books of the different American and foreign registry associations are being constantly added to the library. The College possesses the most complete set of the English Shorthorn herd books in existence in America. Through herd book study, the student is enabled not only to inform himself in regard to pedigrees, but he is enabled also to study the different scales of points



A FARM DRAFT TEAM

which the breeders have adopted to represent the highest types of the various breeds.

The department is also equipped with photographs, charts, and lantern slides which are used in the lecture room when it is impossible to illustrate with the living animal. The abundant material available from the herds and flocks is used extensively in all lectures and score card practice. By means of score cards prepared by the department, the students are brought in close contact with the animals, and through them are informed on the points of market merit desirable in ordinary stock while later the use of the official scale of points for the different breeds in a similar way, makes them skillful in judging representatives of different breeds.

As soon as the student is familiar with the use of the score card, comparative judging is introduced. In comparative judging from four to six animals are used, and each student is required to place all the animals in order of merit, and write down clearly and concisely on a blank folder, prepared especially for this work, full reasons for making his awards. This kind of work teaches the student to compare animals and to balance the weak and the strong points of each in making his final awards. As soon as the student demonstrates his ability to place classes well, herd groups and sweepstake classes are introduced during his Senior year's work. This kind of work is similar to the most difficult judging done at our leading state fairs and international expositions. As soon as the student shows that he possesses the qualifications needed to judge stock in the show ring, he is sent out, in answer to the many requests from the secretaries, to judge various classes of stock at county fairs. This in connection with his college work, results in establishing the lessons learned in the class room.

Positions Open for Men Trained Along Animal Husbandry Lines.

There is a great demand for competent young men trained along the lines of practical and scientific Animal Husbandry work, men who combine their college training with practical experience and native ability. Such is the training offered to the young men in this course. The demand for such students is unlimited at a compensation not exceeded in any other calling. A few of the many lines of work open to graduates of this department are: College and experiment station work, agricultural journalism, managers of stock farms, salesmen with commission merchants, buyers for the packing houses at the many stock yard centers, and salesmen of animal feedstuffs manufactured by the packing houses, glucose companies, linseed and cotton seed oil companies.

Clay, Robinson & Co. Fellowship Prizes.

Clay, Robinson & Co., Live Stock Commission Merchants, Union Stock Yards, Chicago, offer annually \$1,000.00 in prizes to be awarded to the Agricultural Colleges making the best exhibit of live stock at

the International Live Stock Exposition held at Chicago in December of each year. They stipulate that the money won by the various colleges shall be used for the establishment of fellowship prizes to be awarded to graduate students in the department of Animal Husbandry. These fellowships, amounting to \$250.00 per student annually, are granted by the Board of Trustees upon the recommendation of the dean of the Division of Agriculture and the head of the department. A student holding a fellowship may pursue post-graduate work in Animal Husbandry.

WINTER COURSE IN STOCK JUDGING.

(January 4, 1909, to January 16, 1909).

In response to a widespread demand for special short course instruction in the judging and feeding of animals, a two weeks' course has been established during the winter vacation. This course will begin January 4, 1909, and continue for two weeks. It will be devoted exclusively to score card practice, and judging of horses, cattle, sheep, and hogs, and lectures on feeding the same.

In this work special attention will be given to the selection of animals best suited for feeding purposes. Good specimens of the highest type of fat steers and ideal representatives of all the various breeds will be used for class work. At the conclusion of the cattle work a slaughter test and block demonstration of the various market types of steers will be conducted under the supervision of John Gosling, Kansas City, Missouri. This course is intended especially for the man on the farm that cannot avail himself of the opportunity to take a complete course.

A special course in corn judging will be given at the same time and the work will be so arranged that all those present may take both lines of work.

To cover in part the expense of procuring additional help and stock for demonstration, a tuition fee of \$3.00 for residents and \$5.00 for non-residents will be charged for admission to this course, but one fee will cover the instruction in both grain and stock judging.

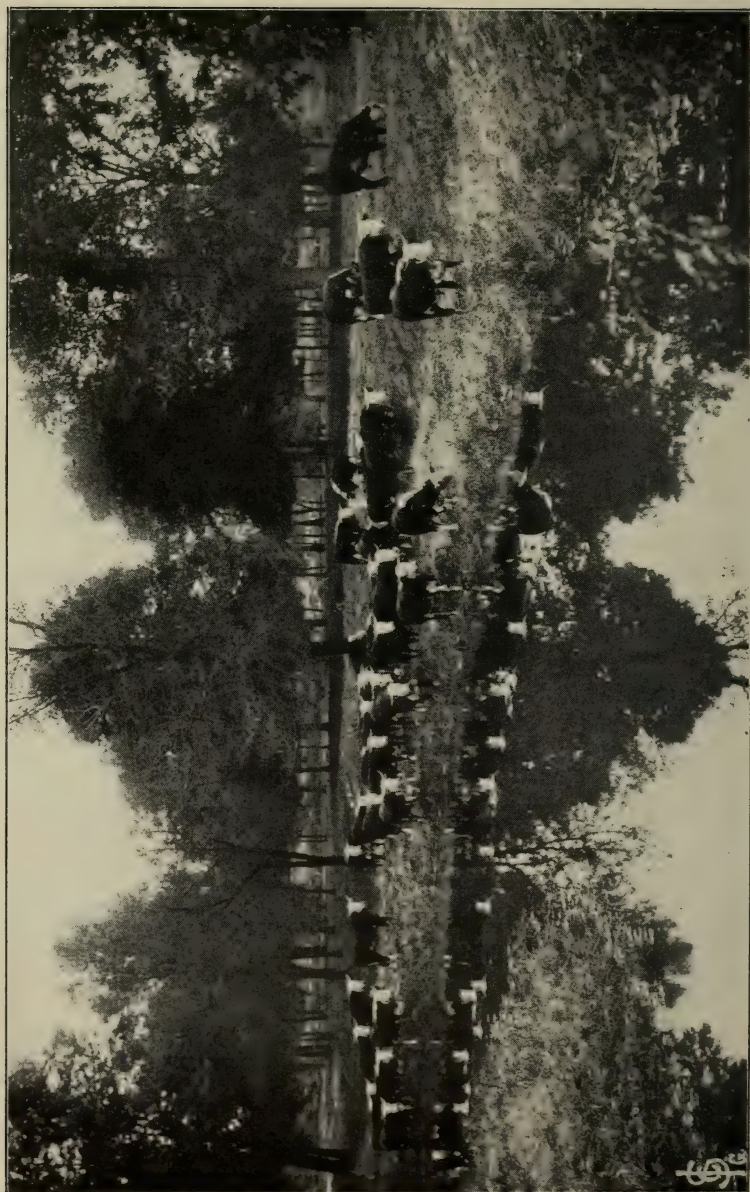
COURSE IN ANIMAL HUSBANDRY.

For Freshman year, see Agricultural Courses, page 65. All Agricultural students will take the same work until the beginning of the Sophomore year.

Sophomore Year.

FIRST SEMESTER.

		Required semester hours
Animal Husbandry 3,	Breed Types of Cattle and Sheep	4
Agricultural Engineering 4,	Farm Engineering	4



PASTURE SCENE ON THE COLLEGE FARM

Zoology 2,	General Zoology	5
Agricultural Chemistry 21,	Elementary Experimental Chem-	
	istry	5
Horticulture 3,	Orcharding	3
Military 3, or Athletics,		—
	Total semester hours	21

SECOND SEMESTER.

		Required semester hours
Animal Husbandry 4,	Breed Types of Dairy Cattle,	
	Horses and Swine	4
Agricultural Engineering 5,	Farm Machinery and Farm	
	Motors	3
Zoology 3,	General Zoology	5
Agricultural Chemistry 23,	Elementary Experimental Chem-	
	istry	5
Botany 26,	Ecology	2
English 12,	Argumentation	2
Military 4, or Athletics,		—
	Total semester hours	21

Junior Year.

FIRST SEMESTER.

		Required semester hours
Animal Husbandry 11,	Feeding and Management of	
	Live Stock	2
Animal Husbandry 30,	Poultry Judging	3
Agricultural Chemistry 25,	Agricultural Analysis	4
Soils 1,	Soil Physics	5
Zoology 5,	Embryology	3
		—
		17

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from seventeen to twenty hours per week

0 to 3

Total semester hours

17 to 20

SECOND SEMESTER.

		Required semester hours
Animal Husbandry 8,	Animal Breeding	2
Animal Husbandry 12,	Feeding and Management of Live Stock	2
Animal Husbandry 31,	Poultry Management	3
Soils 2,	Soil Fertility	5
Zoology 8,	Animal Parasites	2
Agricultural Chemistry 26,	Agricultural Analysis	4
Animal Husbandry 22,	Seminar	1
		—
		19

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from nineteen to twenty hours per week

0 to 1

Total semester hours . 19 to 20

Senior Year.

FIRST SEMESTER.

		Required semester hours
Animal Husbandry 6,	Advanced Live Stock Judging	2
Animal Husbandry 9,	Animal Nutrition and Packing House By-Products	2
Veterinary 19,	Obstetrics	1
Veterinary 44,	Sanitary Science	2
Veterinary 55,	Anatomy of Domestic Animals	2
		—
		9

Elective:

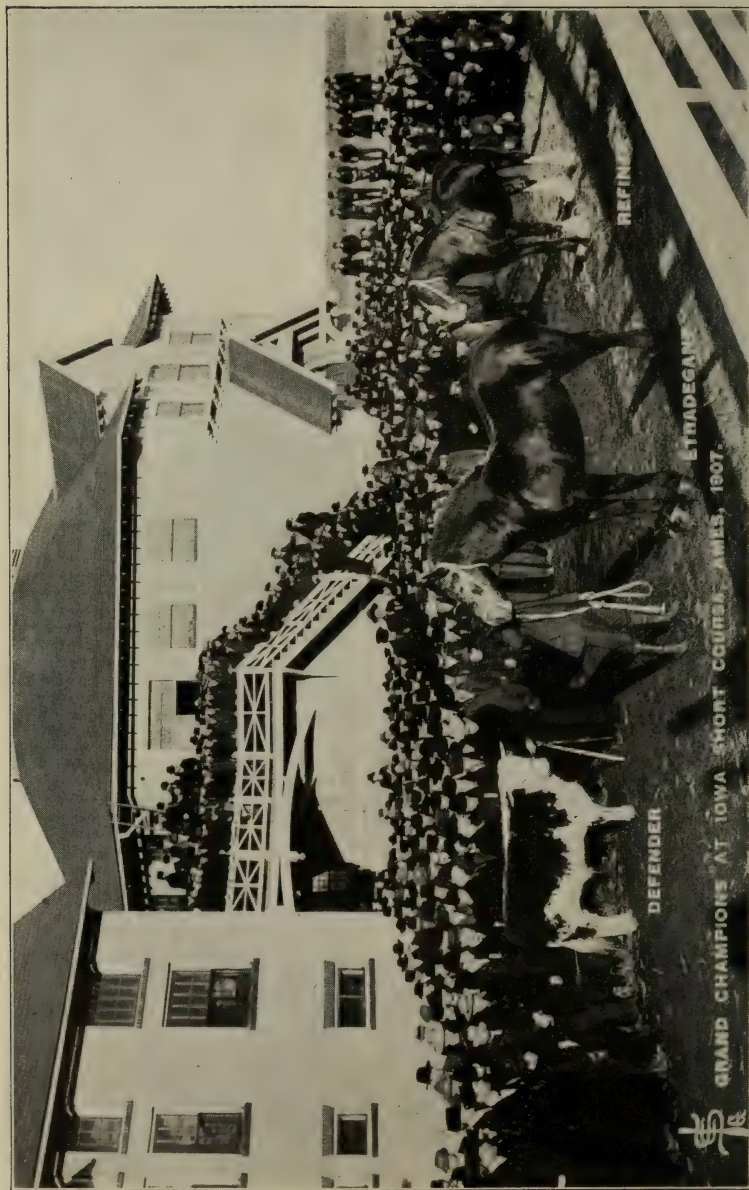
The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week

7 to 11

Total semester hours 16 to 20

SECOND SEMESTER.

		Required semester hours
Animal Husbandry 7,	Herd Book Study	2
Animal Husbandry 10,	Thesis	2
Animal Husbandry 13,	Advanced Work in Beef Pro- duction	1



INTERNATIONAL GRAND CHAMPIONS AT SHORT COURSE

Animal Husbandry 14,	Advanced Work in Pork Production	1
Animal Husbandry 15,	Milk Production	1
Animal Husbandry 16,	Advanced Work in Mutton and Wool Production	1
Animal Husbandry 17,	Advanced Work in Horse Feeding	1
Animal Husbandry 23,	Seminar	1
Veterinary 16,	Horse Shoeing	2
Veterinary 18,	Conformation and Soundness	2
Zoology 6,	Evolution of Animals	1
		<hr/>
		15

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week

1 to 5

Total semester hours

16 to 20

COURSES IN ANIMAL HUSBANDRY.

1. Market Types of Cattle and Sheep. Required the first semester of Freshman year in the Agricultural courses and first semester of Sophomore year in Veterinary Course. Includes the judging of different market classes of cattle, both beef and dual purpose, and sheep, both mutton and wool. Credit two hours. Two 2-hour judging periods per week. Fee, \$2.00.

2. Market Types of Dairy Cattle, Horses and Swine. Required the second semester of Freshman year in the Agricultural course and second semester of Sophomore year in Veterinary course. Includes judging different market classes of dairy cattle, light and heavy horses, and swine, (bacon and fat). Two 2-hour judging periods per week. Fee, \$2.00.

3. Breed Types of Cattle and Sheep. Required the first semester of Sophomore year in Agronomy, Dairy, and Animal Husbandry courses, and first semester of Junior year in Veterinary course. Includes judging representatives of different breeds according to their official standards, a study of their origin, history, characteristics, and adaptability to different conditions of climate and soil. Prerequisite, Animal Husbandry 1. Four hours credit. Lectures, two hours and two 2-hour judging periods per week. Fee, \$2.00.

4. Breed Types of Dairy Cattle, Horses and Swine. Required the second semester of Sophomore year in Agronomy, Animal Husbandry, and Dairy courses, and second semester of Junior year in Veterinary course. Includes judging of representatives of different

breeds according to their official standards, a study of their origin, history, characteristics, and adaptability to different conditions of climate and soil. Prerequisite, Animal Husbandry 2. Four hours credit. Lectures, two hours and two 2-hour judging periods per week. Fee, \$2.00.

6. Advanced Live Stock Judging. Required the first semester of Senior year in Animal Husbandry course. Includes judging horses, cattle, sheep and swine, especially in groups similar to county and state fair work. Prerequisites, Animal Husbandry 3 and 4, and Zoology 2 and 3. Two hours credit. Two 2-hour judging periods per week. Fee, \$2.00.

7. Herd Book Study. Required the second semester Senior year in Animal Husbandry and elective the second semester of Junior or Senior year in all other Agricultural courses. Includes a study of herd books, with a view to becoming acquainted with the pedigrees of the leading strains and families of the different breeds of livestock. Prerequisites, Animal Husbandry 3 and 4. Recitations, two hours per week.

8. Animal Breeding. Required the second semester of the Junior year in the Animal Husbandry and Veterinary Courses. Embraces a study of principles of breeding, including selection, heredity, atavism, variation, fecundity, with the presentation of methods of breeding, in-and-in breeding, cross breeding, etc., and a historical study of their results, also the several features relating to the higher breeding of pure bred stock. Prerequisites, Animal Husbandry 3 and 4, and Zoology 5. Recitations, two hours per week.

9. Animal Nutrition and Packing House By-Products. Required the first semester of Senior year in Agronomy, Animal Husbandry, Dairy, and Science and Agricultural courses, and elective in Horticulture course. Study of anatomy and physiology of the digestive system, the purpose of nutrition, the theory and practical economy of rations for growth, fattening, milk or maintenance; sanitation of feeds and hygiene of the farm. Prerequisites for Agricultural courses, Chemistry 21, 23 and 25. Recitations, two hours per week.

10. Thesis. Required the second semester of Senior year in Animal Husbandry course. Must be along some line to be arranged with the head of the department. Two hours credit.

11. Feeding and Management of Live Stock. Required the first semester of Junior year in Animal Husbandry, first semester, Freshman in Veterinary, and elective first semester Junior or Senior year in all other Agricultural courses. The practical feeding, care and management of beef and dairy cattle. Two hours credit. Lecture, one hour and laboratory two hours per week. Fee, \$2.00.

12. Feeding and Management of Live Stock. Required the second semester of Junior year in Animal Husbandry, second semester Freshman in Veterinary, and elective second semester Junior or Senior year in all other Agricultural courses. The practical feeding, care and management of horses, hogs and sheep. Prerequisite, Animal Husbandry

INTERNATIONAL PRIZE WINNERS AT AMES



11. Two hours credit. Lecture, one hour and laboratory, two hours per week. Fee, \$2.00.

13. Advanced Work in Beef Production. Required the second semester of Senior year in Animal Husbandry course. A systematic study of the most successful and economical methods of producing beef cattle for market purposes; production of baby beef; advisability of long and short feeding periods; and the feeding of grain rations to cattle on grass. Prerequisites, Animal Husbandry 9, and Zoology 5 and 8. One hour credit. Five 1-hour periods per week for first five weeks.

14. Advanced Work in Pork Production. Required the second semester Senior year in Animal Husbandry course. A systematic study of most successful and economical methods of growing and finishing pigs of both the lard and bacon types for market purposes. Prerequisites, Animal Husbandry 9, and Zoology 5 and 8. One hour credit. Five 1-hour periods per week for second five weeks.

15. Milk Production. Required the second semester of Senior year in Animal Husbandry and Dairy courses. Study of various feeding stuffs and the methods of preparing and feeding same as related to most successful and economical production of milk. Prerequisite, Animal Husbandry 9. One hour credit. Five 1-hour periods during four weeks following Animal Husbandry 14.

16. Advanced Work in Mutton and Wool Production. Required second semester Senior year in Animal Husbandry course. A thorough study of various feeding stuffs as related to economical production of mutton and wool. Prerequisites, Animal Husbandry 9, and Zoology 5 and 8. One hour credit. Five 1-hour periods per week following Animal Husbandry 15.

17. Advanced Work in Horse Feeding. Required the second semester of Senior year in Animal Husbandry course. A study of most successful and economical methods of growing and developing young animals; most economical and satisfactory rations for horses at light, medium and heavy work; study of the feeding stuffs best adapted to the production of heavy and economical gains on horses which are being fattened for market. Prerequisites, Animal Husbandry 9, and Zoology 5 and 8. One hour credit. Five 1-hour periods per week following Animal Husbandry 16.

18. Breeding and Judging Dairy Stock. Required second semester of One Year Dairy course. Judging dairy stock with the score card and by comparative judging; also study of principles, methods and practice of breeding dairy stock and their improvement. Two hours credit. Lecture, one hour and laboratory, one hour per week.

19. Feeding Dairy Stock. Required the first semester of one year Dairy course. Principles of feeding animals for the most economical production, with the composition and use of various feeding materials, feeding of dairy cows, including the influence of various feeding stuffs on the quantity, quality and composition of milk, butter and cheese. Two lectures per week.

20 Animal Feeding. Required first semester of Junior year in Veterinary Course. A study of the composition and digestibility of feeding stuffs; the preparation of coarse fodders; the grinding, steaming and cooking of feeding stuffs; feeding standards and the calculation of rations; feeding for meat, milk, wool, growth and work. Prerequisites, Veterinary 4 and 24, and Chemistry 13. Two hours credit.

21. Principles of Breeding. Required first semester of Junior year in Agronomy and Dairy Courses and elective first semester of Junior or Senior year in all other agricultural courses. An elementary course in breeding offered to meet the demands of those students who have not sufficient foundation to take the regular course in Animal Breeding. Embraces a study of the general principles of breeding, selection, variation, heredity, atavism, etc., and a historical study of the results to date. Prerequisites, Animal Husbandry 1 and 2. Two hours credit.

22. Animal Husbandry Seminar. Required first and second semesters of Junior year in Animal Husbandry course. One hour credit.

23. Animal Husbandry Seminar. Required first and second semesters Senior year in Animal Husbandry Course. One hour credit.

The Animal Husbandry Seminar Courses 22 and 23 meets once each two weeks while college is in session, and has for its members the professors and instructors in Animal Husbandry, and all students in the Junior and Senior classes in the course in Animal Husbandry. At each meeting, four students—two Seniors and two Juniors—present papers on associated Animal Husbandry topics. These subjects are selected a half year in advance and follow, in regular series, Animal Breeding, Relation of Animal Husbandry to other industries, Animal Feeding, and a study of Live Stock organizations, expositions, College and Experiment Station Organization and Equipment.

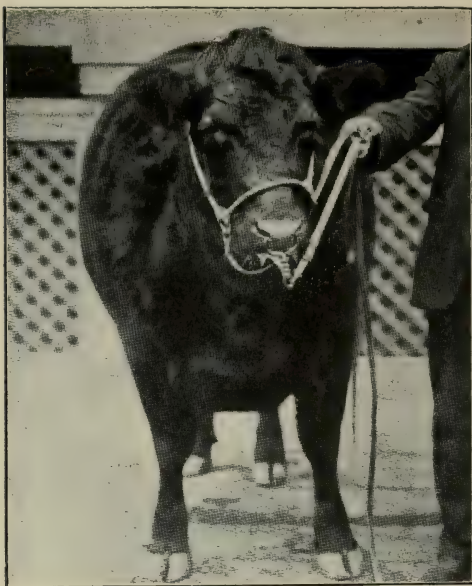
POULTRY HUSBANDRY.

The Courses in Poultry Husbandry afford opportunities for instruction in all lines of poultry work, such as the selection, care and management, incubating, brooding, judging, breeding, feeding, showing, marketing, and diseases of various varieties of fowls, ducks, turkeys and geese.

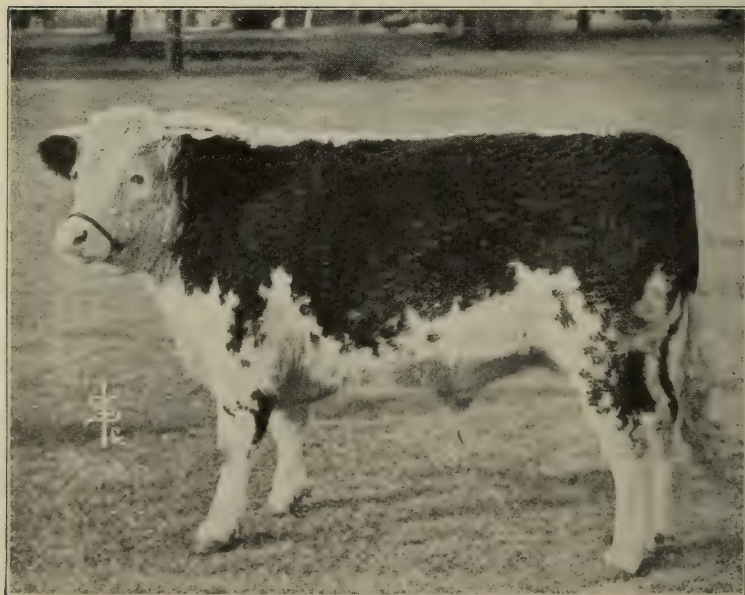
The Poultry Farm of nearly twenty acres upon which the buildings have been erected this year offers unexcelled opportunities for practical instruction.

INVESTIGATION AND THE REARING OF YOUNG STOCK.

The buildings consist of a large headquarters building, long poultry house and colony houses for brooders, young stock and breeding stock. The Headquarters Building contains a large feed room, carpenter shop, incubator room, killing and marketing room, egg room, and room for attendants; and is without doubt the best building of its kind in the country. The long poultry house, of the cloth curtain type, consists of seven 12x12 pens which, together with the colony houses, have a capaci-



BLACK ROCK—INTERNATIONAL GRAND CHAMPION OF 1905



DEFENDER—INTERNATIONAL GRAND CHAMPION OF 1906

ty of approximately one thousand head of poultry, which is used in laboratory and investigational work. All pens are equipped with trap nests so that individual egg records may be obtained from each hen. The Incubator room is equipped with machines made by several of the leading incubator firms and affords opportunity for a complete study of the different types of incubators. A thorough study of the latest brooding methods is also made.

POSITIONS OPEN TO MEN TRAINED ALONG POULTRY HUSBANDRY LINES.

At the present time there is an urgent and increasing demand for College men who possess scientific training in Poultry Husbandry together with practical experience and ability. Some of the openings for students trained along these lines are college and Experiment Station work, managers of utility and fancy poultry farms, poultry journalism and poultry judging, managers of poultry supply houses and poultry feed departments, superintendents and buyers for poultry fattening establishments, salesmen with the incubator and brooder manufacturers.

COURSES IN POULTRY HUSBANDRY.

30. Poultry Judging. Required first semester Junior year in the Animal Husbandry course, elective first semester Junior or Senior year in all other Agricultural courses. This course includes a study of the origin, history, and classification of the various breeds and varieties, and the scoring, judging and breeding of the most important varieties, in accordance with the American Standard of Perfection. Practice will be given in the study of feather markings, judging and fitting of birds for show. Three hours credit. Lectures, two hours and 1 two-hour laboratory period per week. Fee, \$2.00.

31. Poultry Management. Required second semester Junior year in the Animal Husbandry course, elective second semester Junior or Senior year of all other Agricultural courses. This course includes a study of poultry houses, arrangement of buildings and yards, feeds and feeding, judging for market types, incubation, brooding, anatomy of fowl and egg, diseases, sanitation, caponizing, killing, dressing and marketing of poultry products. Three hours credit. Lectures two hours and 1 two-hour laboratory period per week. Fee, \$2.00.

32. Practice in Feeding and Management. Elective first semester Junior or Senior year in all Agricultural courses and must be accompanied or preceded by course 30. The student will be given charge of a pen of fowls and will be required to keep a record of the amounts and cost of food consumed, gains made, eggs produced and calculate the profit or loss. This work will cover a period of three weeks, and the student must be present morning, noon and afternoon, time to be arranged by appointment with the instructor. One hour credit. Fee, \$2.00.

33. Incubator Practice. Elective second semester of the Junior or Senior year in all Agricultural courses and must be accompanied or preceded by Course 31. Each student will be given charge of one or more incubators for the period of one hatch and required to keep records of fuel consumed, temperatures, infertile eggs, dead germs, dead in shell, chicks hatched and reckon the cost of incubation. This course will cover a period of four weeks and the student must be present morning, noon and afternoon; time to be arranged by appointment with the instructor in charge. One hour credit. Fee, \$2.00.

34. Brooder Practice. Elective second semester Junior and Senior year in all Agricultural courses and must be accompanied or preceded by course 31 and preceded by course 33. Each student will be given charge of chicks in a brooder for four weeks from time of hatching and must keep records of temperatures, fuel and foods consumed, gains made, mortality, and calculate the cost of brooding. The student will be required to be present morning, noon and afternoon; time to be arranged by appointment with instructor. One hour credit. Fee, \$2.00.

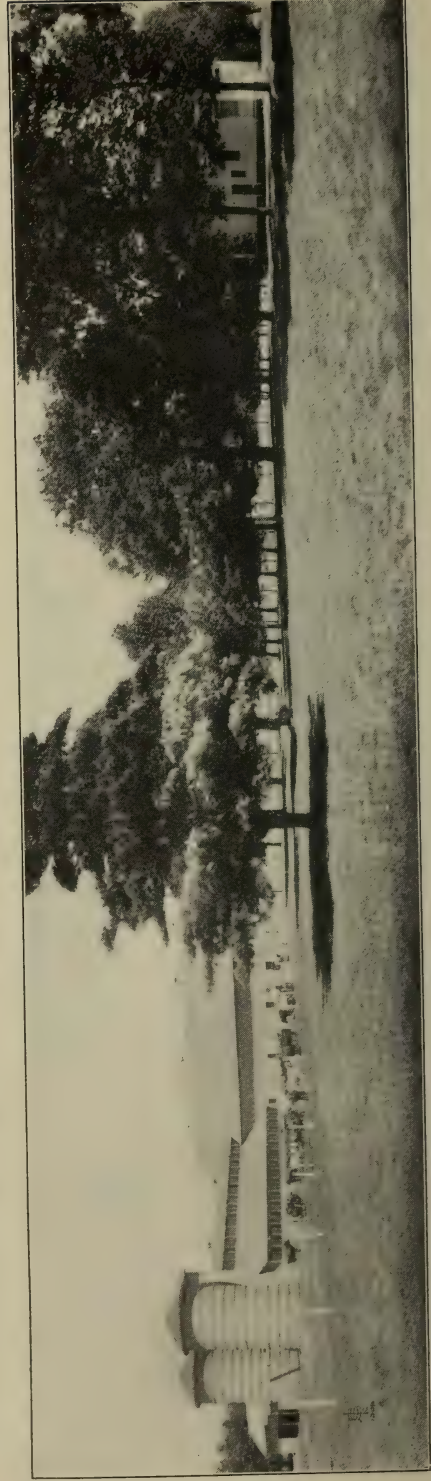
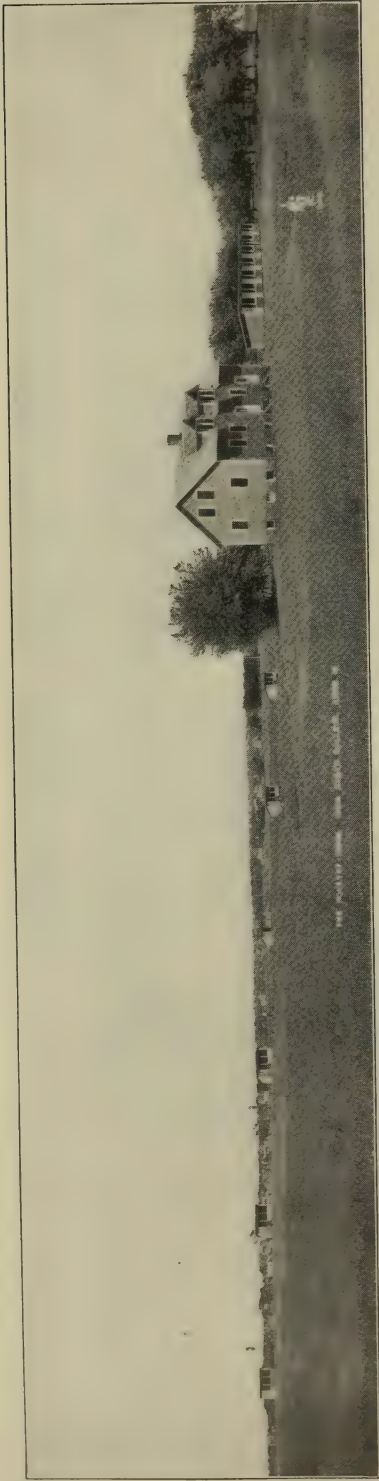
35 and 36. Poultry Research and Experimentation. Elective Senior year in all Agricultural courses. Open only to those who have taken courses 30 to 34. This course is intended for those students who wish to fit themselves especially for college and experiment station work in Poultry Husbandry. This course will include a report of special research on some poultry topic, a study of the Poultry Husbandry work now being carried on in the experiment stations throughout the country, methods and technique of breeding from egg production and meat types, arrangement of experimental records and data in feeding, breeding, incubation and brooding. This course extends throughout the year. Time by appointment. One hour credit each semester. Students electing this course should also take their thesis in Poultry Husbandry. Fee, \$2.00

ONE YEAR POULTRY HUSBANDRY COURSE.

This course is intended for those students who wish to prepare themselves for practical poultry work and have but one year to devote to study and practice. The course will consist of courses 30 to 34 inclusive, practical work on the Poultry Farm, and reports on especially assigned topics. The practical work will consist of five to eight hours work per day in the caring for poultry, building of colony houses, running of incubators and brooders, killing and dressing, mixing of feeds, and such other work as is ordinarily done on a poultry farm. This gives the student a chance to acquire that skill which comes only from practice.

POST GRADUATE WORK IN POULTRY HUSBANDRY.

Because of the newness and great scope of the field, Poultry Husbandry offers many opportunities for doing valuable research work. Unexcelled opportunities are offered for the common application of



THE POULTRY PLANT—THE DAIRY FARM

training the student may have received in embryology, bacteriology, physics, zoology, entomology, farm architecture, etc. Some of the lines along which the student may work are:

1. Breeding. Because of the shortness of generations and widely varying characteristics in color and shapes of varieties, poultry offers unexcelled opportunities for study of unit characters in crossing and the laws of heredity. Work may be also done along the lines of breeding for meat type and increased egg production.

2. Feeding. Comparative studies of different rations for laying and breeding stock, rearing and fattening or finishing. Comparison of breeds in regard to gains made on certain rations. Effect of feeding on color of feathers or composition of flesh and eggs.

3. Housing. Comparison of glass front, curtain front or combination glass and curtain front houses. Comparison of large and small flocks. Study of colony houses, Poultry House Sanitation.

4. Incubation. This branch of the industry is in great need of investigation because of its vast importance and the little knowledge we now have of its laws. Such lines of work could be taken up as: Effect of moisture or non-moisture methods on the hatchability of eggs and vitality of chicks; value of carbon dioxide in incubation; study of natural methods; loss in weight in incubation; change in the structure and density of the shell; selection of chicks as they hatch for constitutional vitality; difference in incubation management for eggs of different classes of poultry.

5. Brooding and Rearing. Brooding in large versus small flocks; natural versus artificial brooding; study of brooder diseases; effects of temperature on health and growth of chicks.

6. Poultry Diseases and Pests. Study of Cholera, sorehead, black head, roup and other poultry diseases with a view to prevention and cure. Study of lice, mites, rats and other pests with a view to their extermination.

7. Comparative Anatomy. To determine the comparative market values, distribution of edible meat, textures of flesh and different types of various breeds.

The many varieties of stock, buildings, incubators, brooders and other equipment on the poultry farm, together with birds shipped in from all parts of the state, are available for this work.

Graduate Work in Animal Husbandry

Post graduate work in Animal Husbandry may be taken along any of the following lines:

1. Animal Nutrition. Because of the large number of horses, cattle, sheep, and swine feeding experiments being conducted on the College Farm, the opportunities for doing research work in this line are unequalled.

2. Animal Breeding, including special work along new and original lines pertaining to principles underlying Animal Breeding.

3. Study of Breeds. With not only typical specimens, but also, in most cases, complete breeding herds of almost every recognized breed of live stock on the continent, the post graduate student is offered unexcelled opportunity for studying breeds adapted to Iowa conditions.

4. Stock Judging. For this work, all the various market types of animals and good representatives of pure breeds are available. These are carefully studied on foot, then slaughtered for a block test and the exact percentages and values of various cuts determined.

5. Practical Management of Stock. A study and investigation of methods employed on best managed stock farms and breeding establishments in the United States, Canada, Great Britain, and other countries, thus preparing students to manage stock farms.

DEPARTMENT OF HORTICULTURE AND FORESTRY

S. A. BEACH, PROFESSOR.

A. T. ERWIN, ASSOCIATE PROFESSOR.

CHAS. A. SCOTT, ASSOCIATE PROFESSOR IN CHARGE OF FORESTRY.

LAURENZ GREENE, ASSISTANT.

O. J. B. SMITH, ASSISTANT.

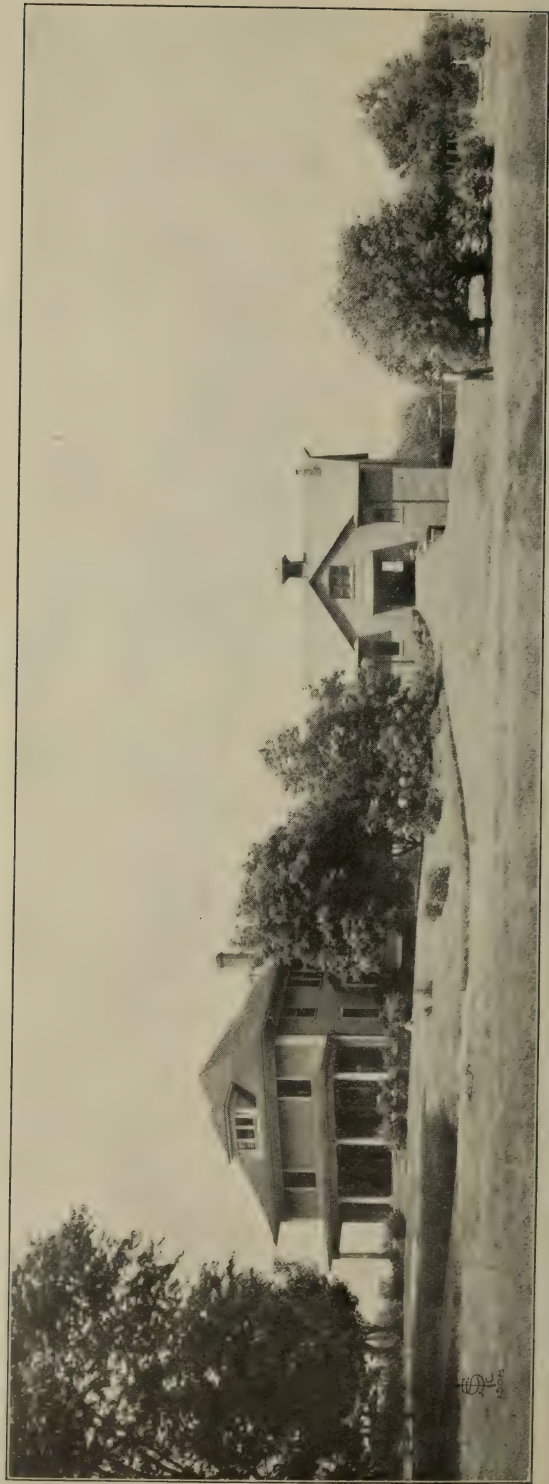
GEORGE R. BLISS, EXTENSION WORK.

The department of Horticulture and Forestry with its orchards, plantations of small fruits and vegetables, forest garden, forest area, pomological and forestal museum, greenhouses, laboratories and library, affords excellent opportunities for instruction and research.

A large part of the library of the Department is kept in its offices in Agricultural Hall where it is available to students specializing in this line of work. Besides a fairly complete collection of publications pertaining to horticulture and forestry and files of numerous periodicals it also includes the complete library of Charles Downing containing his original drawings and manuscripts and many rare and valuable works on horticulture and forestry.

About 100 acres of land are now available for horticultural and forestal purposes including a recently added tract of 60 acres which has not yet been developed. Besides this the campus of more than 100 acres affords opportunities for instruction concerning ornamental trees and plants and landscape design.

Orchards ranging in age from two years to fifteen years contain representatives of the hardiest types of cultivated fruits both native and foreign and include over a thousand varieties. Several thousand seedling varieties which have been originated in the work in plant breeding are being tested in the orchards and nurseries. Various methods of stratification, layering, budding, grafting and other operations with plants are given practical illustration in the greenhouses and nurseries. Annual variety tests with leading types of vegetables afford opportunity for study along this line of work.



A SCENE ON THE HORTICULTURAL GROUNDS

The past few years have witnessed a wonderful development in the science of Forestry due in large part to the increasing scarcity of timber so necessary in the development of every state and community. Large manufacturers and lumbermen are turning to practical forestry as a means of insuring the permanency of their industries. This is causing an increasing demand for trained men to manage our existing forests, provide for future crops, and reclaim barren non-agricultural lands by tree planting. The Government Forest Service calls for a number of college graduates each year and trains them in scientific forestry work. To meet these numerous demands for men, several colleges and universities including this one, are giving courses of instruction in Forestry.

The questions that are of greatest importance in the development of forestry in Iowa are the formation, care and harvesting of the farm grove and woodlot and the prevention of stream erosion by tree planting, hence special attention is paid to these problems. Although Iowa is classed as a prairie state, yet there are excellent opportunities for the practical study of forestry in many parts of the state. There are several planted groves and considerable timber upon and near the college campus.

The museum of the department contains a large collection of woods native to this country, tropical America and the Philippine Islands which afford the student ample opportunity for becoming acquainted with the structure and gross appearance of the principal commercial timbers on the markets of this country.

HORTICULTURE AND FORESTRY IN WINTER SHORT COURSE

(January 4, 1909, to January 16, 1909).

The Department of Horticulture and Forestry offers work during the winter short course which is designed especially to meet the needs of men who have not the opportunity to take a complete course. Instruction will be given in up-to-date methods of combating insects and diseases of the orchard and garden and in the operation of various kinds of spraying apparatus from hand pumps to gasoline power machines. Other subjects which will be studied are the harvesting and storage of apples, especially the handling of apples in cold storage; varieties best adapted to the various sections of the state both for home use and commercial planting; pruning and other practical topics pertaining to orchard management; propagation of plants including grafting, layering, budding and the growing of cuttings; management of farm woodlots and planted groves; most profitable trees to plant; treatment of posts to prevent decay; and the laying out and ornamental planting of home grounds.

The College campus affords excellent opportunity for studying the different varieties of deciduous trees, evergreens, and other ornamentals. Leading varieties of orchard fruits and potatoes from different sections of the state will be supplied for exhibition and laboratory use.

COURSE IN HORTICULTURE AND FORESTRY

For Freshman year, see Agricultural Courses page 65. All Agricultural students will take the same work until the beginning of the Sophomore year.

Sophomore Year.

FIRST SEMESTER.		Required semester hours
Horticulture 1,	Vegetable and Greenhouse Crops	3
Agricultural Engineering 4,	Farm Engineering	4
Soils 1,	Soil Physics	5
Agricultural Chemistry 21,	Elementary Experimental Chemistry	5
Economic Science 9,	Outlines of Economics	3
Military 3, or Athletics,		—
Total semester hours		20

SECOND SEMESTER.		Required semester hours
Horticulture 7,	Pomology	2
Horticulture 15,	Silviculture	2
Agricultural Engineering 8,	Spraying Apparatus	1
Zoology 16,	General Zoology	5
Agricultural Chemistry 23,	Elementary Experimental Chemistry	5
English 12,	Argumentation	2
Choice {	Economic Science 10,	3
	Agricultural Economics	
	French Revolution and XIXth Century	
History 6,		3
Military 4, or Athletics,		—
Total semester hours		20

Junior Year.

FIRST SEMESTER.		Required semester hours
Choice {	Horticulture 5,	3
	Horticulture 18,	
Zoology 4,	Forest Utilization 3	4
Agricultural Chemistry 25,	Entomology 4	4
Elective:	Agricultural Analysis	4

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week

Total semester hours	5 to 9
	16 to 20



PART OF THE DISPLAY OF FRUIT AND POTATOES AT THE HORTICULTURAL SHORT COURSE

SECOND SEMESTER.

		Required semester hours
Horticulture 10,	American Horticulture	2
Botany 11,	Vegetable Physiology	4
Botany 15,	Systematic Botany	3
Soils 2,	Soil Fertility	5
		—
		14

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week.

2 to 6

Total semester hours 16 to 20

Senior Year.

FIRST SEMESTER.

		Required semester hours	
Horticulture 8,	Landscape Gardening	3	3
Horticulture 9,	Research Work	2	2
Horticulture 16,	Forest Development and Policy	2	2
Botany 5,	Vegetable Pathology	3	5
		—	—
		10	12

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week.

6 to 10

Total semester hours 16 to 20

SECOND SEMESTER.

		Required semester hours	
Choice {	Botany 24, and	Plant Embryogeny	1
	Horticulture 4,	Plant Breeding	3
	Horticulture 17,	Wood Technology	3
	Horticulture 13,	Thesis	2 2
	Botany 40,	General Bacteriology	2 2
		—	—
		8	7

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week.

9 to 13

Total semester hours 16 to 20

COURSES IN HORTICULTURE

1. **Vegetable and Greenhouse Crops.** Required, first semester Sophomore in Horticultural Course, and elective in all other Agricultural courses. The general culture of vegetables in the field and under glass and also other commercial crops grown under glass. Three hours credit. Two lectures and one laboratory.
2. **Plant Propagation.** Required second semester Freshman year in the Agricultural course. Propagation of plants by sexual and non-sexual methods; germination, testing and storage of seeds, multiplication of plants by cuttage, layerage and graftage, including both greenhouse and nursery types. Three hours credit. Recitations, two hours and laboratory, two hours per week. Fee, \$1.00.
3. **Orcharding.** Required first semester Sophomore year in Animal Husbandry, Agronomy, Dairy and Science and Agriculture courses. The establishment and care of home orchards and vineyards; systematic study of varieties adapted for planting in Iowa. Three hours credit. Recitations, two hours and laboratory two hours per week. Fee, \$1.00.
4. **Plant Breeding.** Required second semester Senior year in Horticulture, Agronomy and Science and Agriculture, elective second semester Junior or Senior year in all other Agricultural courses. Study of the principles of plant breeding and their application to the improvement of plants. Plant Embryogeny, Botany 24, prerequisite or required with this course. Recitations, three hours per week.
5. **Advanced Pomology.** Required first semester Junior year in Horticulture, elective first semester Junior or Senior year in all other Agricultural courses. Commercial orcharding; grading, storing and marketing fruit; fruit judging; orchard and nursery technique. Prerequisite, Horticulture 2. Three hours credit. Recitation, one hour and laboratory, two hours per week. Fee, \$1.00.
7. **Pomology.** Required second semester Sophomore year in Horticultural course, and elective Junior or Senior year in all other Agricultural courses. A study of the problems involved in the establishment and care of orchards. Two hours credit. Two lectures and one laboratory. Fee, \$1.00.
8. **Landscape Gardening.** Required first semester Senior year in Horticulture and Science and Agriculture, elective first semester Junior or Senior year in all other Agricultural courses, and Science courses. A study of the principles involved in the planting and decoration of home grounds and parks; ornamentals adapted to planting in Iowa. The ornamental trees and shrubs on the campus and in the department afford excellent material for laboratory work. Three hours credit. Recitations, two hours and laboratory, two hours per week.
9. **Research Work.** Required first semester Senior year in Horticulture, elective first semester Junior or Senior year in all other Agricultural courses. An independent investigation in some line of work



HORTICULTURE AND FORESTRY MUSEUM AND CLASS ROOM

under the supervision of the head of the department. Two hours credit. Two hours per week.

10. Development of American Horticulture. Required in the second semester Junior in Horticultural course and elective in all other Agricultural courses. Study of the development of horticulture in America, including the history of our cultivated fruits, the important workers in this field and the literature pertaining to the same. Two hours credit. Two hours per week.

11. Floriculture. Required first semester Junior year in Domestic Economy, and elective in General Science first semester Junior or Senior year. No course prerequisite. Propagation and general management of house plants and ornamentals for the home grounds. Recitations, two hours per week.

13. Thesis. Required second semester Senior year in Horticulture. The subject chosen must be one requiring independent investigation, the results of which are to be presented in a carefully written report. May be a continuation of Course 9. Two hours credit.

COURSES IN FORESTRY.

14. Farm Forestry. Required first semester Freshman year in all Agricultural courses. Includes life history of a tree; forest influences; distribution of trees in the United States; tree planting in Iowa; growth and care of windbreaks and farm woodlots; structure and uses of common timbers with methods of artificial preservation; classification of trees. Three hours credit. Recitations, two hours and field work, two hours per week. Text, Principles of American Forestry, Green.

15. Silviculture. Required second semester Sophomore year in Horticulture, and second semester Junior in Science and Agriculture; elective second semester Junior or Senior year in all Agricultural courses. Distribution and character of native forests; factors of tree growth; classification and identification of forest trees; collection, storage and germination of seed; species to plant; methods of planting with reference to Iowa conditions; determination of contents of single trees and whole forests; rate of growth and other forest measurements; practical studies of Iowa farm woodlots; valuation of forest crops; methods of reproduction, thinning and final cutting. Two hours credit. Two lectures and two hours field work required in connection with lectures.

16. Forest Development and Policy. Required first semester Senior Horticulture and Forestry; elective Junior or Senior in all other Agricultural courses. Attitude of nations toward forestry; development of forestry in the United States; relation of forestry to national reclamation work; protection of forests against natural enemies. Two hours credit.

17. Wood Technology. Required of Forestry students; elective second semester Senior year in Mechanical, Civil and Mining Engineering and elective second semester Junior or Senior year in all Agricul-

tural courses. A study of common woods, their structure, identification, use, decay and methods of preservation. Three hours credit. Recitations, two hours and laboratory work, two hours per week.

18. Forest Utilization. Required of students specializing in Forestry; elective first semester Junior or Senior year in all Agricultural courses. Study of economic relations of timber to manufacturing industries; conversion of timber into finished products; consumption of timber products; grading of lumber. Prerequisite, Horticulture 15. Three hours credit. Two lectures and two hours field work.

GRADUATE WORK IN HORTICULTURE AND FORESTRY.

Advanced work in Horticulture along the lines indicated in the under-graduate courses is open to properly qualified students. Special facilities are offered for the study of problems bearing upon pomology, the breeding and propagation of plants and the storage of fruits.

In Forestry, opportunity is offered for special investigation of tree planting under prairie condition, including the prevention of erosion and the reclamation of flood damaged lands by tree planting.

SCIENCE AND AGRICULTURE.

The field of Agriculture presents such rapid changes and there is such wide and varied demand for young men combining agricultural and scientific training that it has been deemed advisable to offer a course less technical than the other agricultural courses that relates directly to some special line.

The course in Science and Agriculture is designed to meet the demands of country agricultural high schools and other institutions, public and private, established for the purpose of giving instruction in the general sciences and elementary instruction in agriculture. There will doubtless arise a large demand for strong, broadly educated, well trained teachers for this and other kinds of agricultural instruction in public and preparatory schools where the work is now being introduced.

A new phase of agricultural education has developed in recent years in the various forms of agricultural extension work. This movement is destined to be far reaching in its results and it is clearly one of the most potent influences in the field of agriculture. This phase of agricultural instruction, which is bringing science to the aid of agriculture by reaching the man in the field and on the farm, the children in the public school and the family in the home, is calling for well trained men far in excess of the supply.

COURSE IN SCIENCE AND AGRICULTURE.

For Freshman Year, see Agricultural Courses, page 65. All Agricultural students will take the same work until the beginning of the Sophomore year.



A VIEW IN THE FORESTRY GROUNDS

Sophomore Year.

FIRST SEMESTER.

		Required semester hours
Horticulture 3,	Orcharding	3
Agricultural Engineering 4,	Farm Engineering	4
Agricultural Chemistry 21,	Elementary Experimental Chem- istry	5
Economic Science 9,	Outlines of Economics	3
English 12,	Argumentation	2
Military 3, or Athletics		—
	Total semester hours	17

SECOND SEMESTER.

		Required semester hours	
Zoology 16,	General Zoology	5	5
Botany 15,	Systematic Phanerogams	3	5
Agricultural Chemistry 23,	Elementary Experimental Chem- istry	5	5
Choice { Economic Science 10,	Agricultural Economics	3	} 3 3
History 6,	French Revolution and XIXth Century	3	
		3	
Military 4, or Athletics		—	—
	Total semester hours	16	18

In addition to the above required work, the student will elect enough work to make from 18 to twenty hours per week.

Junior Year.

FIRST SEMESTER.

		Required semester hours
Zoology 4,	Entomology	4
Agricultural Chemistry 25,	Agricultural Analysis	4
Soils 1,	Soil Physics	5
		—
		13

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week

3 to 7

Total semester hours

16 to 20

SECOND SEMESTER.

Required semester
hours

Botany 11,	Vegetable Physiology	4
Botany 40,	Bacteriology*	2
Soils 2,	Soil Fertility	5
		—
		11

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week

5 to 9

Total semester hours

16 to 20

Senior Year.

FIRST SEMESTER.

Required semester
hours

Horticulture 8,	Landscape Gardening	3	3
Botany 5,	Vegetable Pathology	3	5
Animal Husbandry 9,	Animal Nutrition and Packing		
	House By-Products	2	2
		—	—
		8	10

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week

8 to 12

Total semester hours

16 to 20

SECOND SEMESTER.

Required semester
hours

Botany 24,	Plant Embryogeny	1
Horticulture 4,	Plant Breeding	3
		—
		4

Elective:

The student will select from the list of electives on page 111, enough work to make a total of from sixteen to twenty hours per week

12 to 16

Total semester hours

16 to 20



PRODUCTS THAT HAVE MADE IOWA FAMOUS

DEPARTMENT OF AGRICULTURAL JOURNALISM.

L. E. CARTER, INSTRUCTOR.

Three years ago a chair in Agricultural Journalism was established at the Iowa State College by the aid of Mr. John Clay, of the firm of Clay, Robinson & Co., of Chicago. This was distinctly a new departure in the field of agricultural education. By many agricultural journalism was looked upon as a field of labor of peculiar limitations, a field in which excellence could be obtained by heredity, but not by training or study. Mr. Clay, who is himself a most forcible writer, combining to a remarkable degree a wide range of practical information and a fascinating style, believed that training would count for something in this, as in all other lines of agricultural work. His address in the *Plow and the Book*, delivered at Ames, at the inception of this movement has attracted wide attention.

The work, though started in a moderate way, has led to highly gratifying results. It has proven popular with the agricultural students, who have learned that there is great benefit to be derived from the study of this important subject. The graduates who have taken this work at Ames have given good account of themselves. A student who graduated a year ago immediately took a position on one of the leading agricultural papers. At the end of his first year's service his employer was pleased to contract with him for three years' service at a salary of \$2500 for the third year. A student who graduated this last year accepted a similar position on another paper and within a short time was advanced to an important editorial position on another paper of wide influence. Other students are being sought even before graduation.

Not all students are qualified for editorial work, but all may be helped and strengthened by a good course in agricultural journalism, whether they intend to follow this calling or not.

A man who has employed a number of Ames men for special work along this line said he had never yet been disappointed in one of them. An editor of a prominent agricultural paper after passing on the work of last year's class, said: "I don't think I need hesitate to say that I never got hold of nine articles that showed more uniform excellence, more care in preparation and observance of instruction received in the classroom."

In the Live Stock World reporting contest at the 1906 International, Ames men won three out of four first prizes and one-half of the money offered. In the national Corn Show contest, Ames students won thirty-five out of sixty prizes and 68% of the money offered, in competition with one hundred and fifty contestants from nine states. In the Iowa Corn Growers contest, Ames students won first, second, and third prizes and all of the money offered. All of these contests were based upon writing on practical subjects, with practical men as judges.

The work in agricultural journalism is proving that this subject has a place in the curriculum of a modern, well-equipped agricultural college,

and in the education of the future farmer. The work not only stimulates a study of the essentials of agricultural journalism, but it admirably supplements a student's training in English, in clear concise expression, and his knowledge of general agricultural topics.

1. Agricultural Journalism. Elective first semester Junior or Senior year in all Agricultural courses. Includes a study of "The Evolution and Development of the Press, Literary and Mechanic," "Reportorial and Editorial Work on Daily, Weekly and Monthly Papers," "Preparing and Offering MSS." "The Field of Agricultural Journalism, its distinctiveness and special requirements," "The Agricultural Editor and the Agricultural Writer," "Reporting," "The General and the Special Article," "An Analytical Study of the Leading Farm Journals," and other closely allied topics. Articles are assigned to the students twice a month. These are corrected and criticised from the standpoint of the editorial staff to which the student is desirous of submitting his article. The aim of this course is to develop a clear, concise and original style of writing on the topics with which he is most familiar. The best manuscripts are sent to the leading papers of America and are often accepted and published. One hour credit.

2. Agricultural Journalism. Elective second semester Junior or Senior year in all Agricultural courses. Lectures on "Development of Originality," "Choice of Subjects, Titles and Words," "Dignity and Accuracy," "Timeliness," "Paragraphs," "Leader and Editorial Writing," "Reviewing Books, Bulletins and Exchanges," "Free Lance Writing," "Proof Reading," "Illustrations" and "Make-up." Lectures are also given on "Photography, its Principles and Application to Journalism," by Mr. F. E. Colburn, who has had extensive experience in this work. Mr. C. A. Shamel of Chicago has inaugurated a trophy competition whereby the members of the class shall write articles on agricultural topics at the close of the course. The name of the winner is inscribed on the trophy, which becomes his property for a year. Members of this class do special work for many of the best farm papers during this term. Editors and managers of the leading agricultural journals lecture before the students. These talks are invaluable in establishing the students' viewpoint in this profession. Prerequisite, Agricultural Journalism 1. One hour credit.

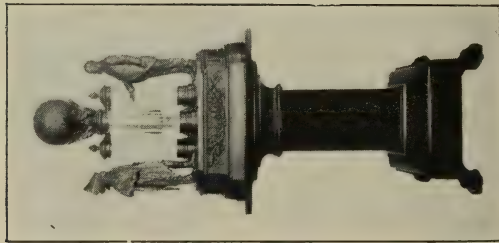
ELECTIVES IN THE AGRICULTURAL COURSES.

Subjects which may be elected in the Junior or Senior year in any of the Agricultural courses, provided the student has the prerequisites for each study chosen.

Semester	Department and Course Numbers
First	Agricultural Chemistry 27, 40.
Second	Agricultural Chemistry 26, 34.
First	Agricultural Engineering 3, 4, 7.
Second	Agricultural Engineering 5, 6, 8.
First	Agricultural Journalism 1.



THE SPOOR CATTLE
TROPHY



THE COOK CORN TROPHY



THE SPOOR HORSE
TROPHY

INTERNATIONAL TROPHIES WON BY IOWA STATE COLLEGE STUDENTS

Second	Agricultural Journalism 2.
First	Animal Husbandry 9, 11, 21, 30, 32, 35.
Second	Animal Husbandry 7, 12, 31, 33, 34, 36.
First	Botany 4, 5, 6, 10, 13, 19.
Second	Botany 3, 11, 12, 15, 24, 25, 30, 36, 40.
First	Civil Engineering 308,
Second	Civil Engineering 409, 713.
Second	Civics 5.
First	Dairying 14, 17, 18.
Second	Dairying 10, 11, 13, 16, 20, 21, 24.
First	Economic Science 1, 3, 7, 9.
Second	Economic Science 4, 5, 6, 10, 11.
First	English 7.
Second	English 8.
First	Farm Crops 3, 8, 10, 11.
Second	Farm Crops 4, 10, 12.
First	Geology 501, 704.
Second	Geology 2, 805, 6, 607.
First	History 3, 5, 10, 12, 20.
Second	History 4, 5, 6, 9, 11, 20.
First	Horticulture 1, 5, 8, 9, 16, 18.
Second	Horticulture 4, 7, 10, 15, 17.
First	Modern Languages—
	Language (French) 1, 3.
	Language (German) 5, 7.
	Language (Spanish) 30, 32.
Second	Modern Languages—
	Language (French) 2, 50.
	Language (German) 6, 26.
	Language (Spanish) 31, 38.
First	Literature 1, 4, 6, 8.
Second	Literature 2, 3, 7, 10, 11.
First	Mathematics 8, 24, 25.
Second	Mathematics 9, 23, 26.
First	Military 5, 7.
Second	Military 6, 8.
First	Physics, 509.

If recommended by the Head of the Department in which the student is taking his major work.

Second	Physics 404.
First	Psychology 1.
Second	Psychology 2, 3.
First	Public Speaking, 3, 5, 10.
Second	Public Speaking 6, 8, 11.
First	Soils 1, 6.
Second	Soils 2, 5, 7, 8.
First	Veterinary 19, 23, 33, 44.

Second	Veterinary 22, 24.
First	Zoology 2, 4, 5, 17.
Second	Zoology 3, 6, 8, 18.

Remunerative and Instructive Labor.

The Agricultural courses afford opportunity to do considerable work in the fields and about the barns and grounds. The compensation for services of this kind ranges from eight to fifteen cents per hour according to the merit of the work. Thus students are enabled not only to earn part of their expenses but also to materially strengthen the practical side of their education. A number of the strongest and most capable students are aided in finding employment during vacations with successful stockmen on good farms and in various other positions in line with their chosen work. Some who have taken a year of practical work in this way during their course, have found it of marked benefit and it has enabled them to command more desirable and remunerative positions at the completion of their College course. Too much emphasis cannot be placed on a thorough understanding of the practical application of correct principles of agriculture.

Credits for Practical Work.

Agricultural students who, by previous agreement with the head of the department, do practical work on farms, horticultural or feeding or breeding establishments, beet sugar factories or forestry reservations, of recognized standing, during their course of study will be allowed credits on the following basis: Students who take practical work of the kind described under the direction of the proprietor and render competent and faithful service, will, on their return to College and on the presentation of a concise written report or resume of their observations and experience, be entitled to the following credits in the four year courses in Agriculture:

For three months, five hours of elective work in the Junior or Senior year; for six months, eight hours; and for one year, ten hours; no more than five hours of which shall be credited in any one term of the College course.

Students must have at least six months of practical work before graduation, but credit will be given for such work only as stated above.

Special Courses.

Students desiring courses shorter than the regular four year courses are permitted to take up special courses in accordance with the general regulations governing such work and subject to the approval of the Dean of Agriculture and the President of the College.

Such courses may cover a period of one semester, one year or two years, but special students are advised to take not less than one year's work in any chosen branch and in all cases where practicable or possible to do so, students are urged to complete the four years' course. The results will justify the time and expense required and modern agriculture demands thorough training, special fitness, and a high order of ability. No degrees are granted for less than four years' course.

Department of Agriculture Scholarships.

The State Department of Agriculture offers scholarship prizes of \$200.00, \$100.00 and \$25.00, open to young men of the state not enrolled as a regular or special student in any agricultural college, without barring the students of the special short courses in January. These scholarship prizes are awarded for the best judging live stock and corn annually at the state fair in accordance with the rules and conditions prescribed by the state department of agriculture governing the contest. These afford opportunities for young men to receive substantial aid toward paying the expenses of a college education, and some excellent students have come to the institution by means of these scholarships.

Mr. J. Ogden Armour of Chicago and the Rosenbaum Live Stock Commission Company of Chicago have donated prizes of \$5000 and \$1000 respectively for competition annually at the International Live Stock Exposition. At the last International the Iowa State College won seven of Armour scholarships of \$250 each and \$300 of the Rosenbaum prizes. These scholarships are awarded annually to worthy students enrolled in the two weeks short courses and in the regular four year courses.

AGRICULTURAL EXPERIMENT STATION

CHARLES F. CURTISS, DIRECTOR.

W. J. KENNEDY, VICE DIRECTOR.

The investigations of the Experiment Station are intimately related to the college work of instruction, as the problems occupying the attention of the Station are those that have a material bearing on the profit of the farm, and they are also those that are timely and in need of accurate investigation. Whether relating to the field, the feed lot or the laboratory, the aim is to investigate those questions which will have a practical relation to successful agriculture. Originality is made a feature of the work so far as is consistent with useful results, and in all instances the sole object is to throw light on the truth relating to the various principles and practices of the farm. The field work strongly supports the instruction of the College in regard to the varieties of grains and the methods of cultivation, thus enabling the student to become acquainted with the latest ideas relating to these. Tests are made of different varieties of fodders, grasses and grains, also of different systems of culture and various crops.

The experimental investigations with animals embrace a study of the value of different feeds for different features of animal production, the preparation of feeds, systems of feeding, also a study of different types of animals suitable for the requirements of the market. The object sought in this department of Station work is to indicate the manner in which the Iowa farmer through the employment of animals can realize the most from his farm products and add to the fertility of the farm. The Experiment Station has reached out in this way to a remarkable degree, bringing sheep from Mexico, Colorado and Scotland, cattle from Texas and Great Britain, horses from Wyoming, Montana and Europe, in its endeavor to thoroughly study this very important feature of the farmer's work. The data from these experiments is always accessible to the student who has the opportunity of observing daily the development of it at every stage.

The work of the Experiment Station is in the closest touch with the Dairy industry. The problems which practical men are constantly confronting and asking aid in solving are at all times objects of experimentation by the Dairy Section. The students not only see but assist in carrying out these experiments. In this way they become acquainted not only with the problems to be solved but with the methods employed in the investigations. This experimental work relates to the various problems of both butter and cheese making. The results of this work together with those of the bacteriological investigations are daily used in class work.

The experimental work in Horticulture also affords the student an opportunity to study the results of the theory of the class room as practiced in the field. The connection of the Department of Horticulture with the State Horticultural Society is such that problems touching the commercial side of fruit growing receive the closest attention. Experiments are conducted in spraying for the prevention of fungus pests and injurious insects; also in fertilizing, pruning, and thinning; in nursery work and in plant breeding. The Station work thus equips the student with the practice and technique necessary to a thorough horticultural training.

The work of the Experiment Station has been increased by the addition of Forestry as a line of investigation. Methods of practical treatment of fence posts and other timbers to increase durability are being determined in coöperation with the United States Forest Service and farmers and stock men throughout the state. The adaptability of various trees for different sections of the state and methods of germination and storage are being tested. To get more definite data in reference to germination of seed and growth of seedlings in nursery rows, tree seed has been distributed to farmers in twenty-five counties of the state.

A 200 acre dairy farm is being stocked and equipped for experimental and educational work in this important line of work. This farm and its equipment will afford excellent facilities for experimental work in the farm production side of the dairy industry. A poultry department is also being added for experimental and instruction work.

AGRICULTURAL EXTENSION DEPARTMENT

P. G. HOLDEN, SUPERINTENDENT.

The Agricultural Extension work was established permanently by enactment of the Thirty-first General Assembly of Iowa. This act provided for giving lectures and demonstrations on the growing of crops and fruits, on stock raising, dairying, land drainage and kindred subjects, including Domestic Science. Specific mention was made in this act of instruction in corn and stock judging at agricultural fairs, institutes and clubs and aid in conducting Short Courses of instruction at suitable places throughout the state.

Under this act the Extension Department has been organized by the Board of Trustees of the college, as a department of the Division of Agriculture.

The demand for the extension work was the natural outgrowth of the experimental and instruction work which has been carried on at the college by the heads of the departments in the Division of Agriculture. It was deemed best to separate it from the instruction and experimental work of the college and employ a special staff for the extension work, to avoid interference with the duties of the heads of departments in conducting the college work. There is necessarily a close relation between all of the heads of departments and the extension work in corresponding lines. The Extension Department by action of the Board of Trustees sustains the same relation to the Division of Agriculture and to the college as a whole, as the other agricultural departments, though this work is confined entirely to instruction and demonstrations given in various parts of the state remote from the college, with the exception of such assistance as members of that staff have rendered in connection with the two weeks Short Course held annually at the college in January.

The extension work has met with general favor and been in wide demand. Last year 1750 calls were received at the college for work of this kind, of which the Extension Department was able to fill 638.

Demonstration work was carried on at ten county farms. 130 corn judging and fourteen stock judging contests were conducted. During the past year Short Courses have been held at Newton, Mt. Pleasant, Red Oak, Avoca, Cedar Rapids, Spencer, Storm Lake, Manchester, Marshalltown, New Providence and Indianola.

GENERAL INFORMATION

ORGANIZATION AND HISTORY

The laws of the State of Iowa provide for the election by the general assembly of a Board of Trustees, one member from each congressional district, whose duty it shall be to manage and control the Iowa State College, at all times supporting the best interest of the institution.

The act establishing "A State Agricultural College and Model Farm" to be connected with the entire agricultural interests of the State was passed by the Legislature of Iowa in 1858. This legislature also appointed a board of commissioners to buy a farm and erect a college building, and elected a board of trustees to select a faculty and organize a college.

In 1859 a farm of six hundred and forty acres situated near Ames was purchased for the use of the College.

In 1862 a bill was passed by Congress, entitled, "An act donating public lands to the several States and Territories, which may provide colleges for the benefit of Agriculture and the Mechanic Arts."

Section 1 of this act provides that for the support of such colleges there be granted "an amount of public land, to be apportioned to each State in quantity equal to thirty thousand acres for each Senator and Representative in Congress to which the States are respectively entitled by the apportionment under the census of 1860; provided that no mineral lands shall be selected or purchased under the provisions of this act."

Section 4 requires: "That all moneys derived from the sale of land aforesaid by the States to which lands are apportioned, and from the sale of land script, hereinbefore provided for, shall constitute a perpetual fund, the capital of which shall remain forever undiminished (except as may be provided for in Section fifth of this act), and the interest of which shall inviolably be apportioned by each State which may take and claim the benefit of this act, to the endowment, support and maintenance of at least one college, where the leading object shall be without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislature of the State may provide, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

Section 5 says: "And be it further enacted, that the grant of land and land script hereby authorized, shall be made on the following conditions, to which, as well as the provisions hereinbefore contained, the previous assent of the several States shall be signified by legislative acts; first, if any portion of the fund, invested as provided by the foregoing section, or any portion of the interest thereon, shall, by any action or

contingency, be diminished or lost, it shall be replaced by the State to which it belongs; so that the capital of the fund shall remain forever undiminished; and the annual interest shall be regularly applied without diminution to the purposes mentioned in the fourth section of this act, except that a sum not exceeding ten per centum upon the amount received by any State under the provisions of this act may be expended for the purchase of land for sites or experimental farms, wherever authorized by the respective Legislatures of said States. Second, no portion of said fund nor the interest thereon shall be applied, directly or indirectly, under any pretense whatever, to the purchase, erection, preservation or repair of any building or buildings."

The General Assembly of Iowa, September 11, 1862, accepted the grant upon the conditions and under the restrictions contained in the act of Congress, and by so doing entered into contract with the General Government to erect and keep in repair all buildings necessary for the use of the College. By this action of the General Assembly the College was changed from an agricultural institution into a College of Agriculture and Mechanic Arts with the broad and liberal course of study outlined in the following paragraph.

In 1882 the General Assembly passed an act defining the course of study to be pursued as follows: Section 1. That Section 1621 of the Code is hereby repealed and the following is enacted in lieu thereof: "Section 1621. There shall be adopted and taught in the State Agricultural College, a broad, liberal and practical course of study, in which the leading branches of learning shall relate to agriculture and the mechanic arts, and which shall also embrace such other branches of learning as will most practically and liberally educate the agricultural and industrial classes in the several pursuits and professions of life, including military tactics. Section 2. That all acts, and parts of acts inconsistent with this act are hereby repealed."

August 30th the following act was approved by President Harrison: "Be it enacted by the Senate and House of Representatives of the United States in Congress assembled, that there shall be and hereby is, annually appropriated, out of any moneys in the treasury not otherwise appropriated, arising from the sales of public lands, to be paid as hereinafter provided, to each State and Territory for the more complete endowment and maintenance of colleges for the benefit of agriculture and the mechanic arts now established, or which may hereafter be established, in accordance with an act of Congress approved July second, eighteen hundred and sixty-two, the sum of fifteen thousand dollars for the year ending June thirtieth, eighteen hundred and ninety, and an annual increase of the amount of such appropriation thereafter for ten years by an additional sum of one thousand dollars over the preceding year, and the annual amount to be paid thereafter to each State and Territory shall be twenty-five thousand dollars, to be applied only to instruction in agriculture, the mechanic arts, the English language and the various branches of mathematical, physical, natural and economic sciences, with special

reference to their application in the industries of life, and to facilities for such instruction."

The income of the College from National grants is therefore expended in instruction, experimentation and illustration in agriculture and in the mechanic arts, and in underlying and related science and literature.

All buildings are erected and all repairs thereon are made by the State of Iowa, the cost down to date being about \$1,150,000.

The College was formally opened on the 17th of March, 1869.

THE SCOPE

The Iowa State College of Agriculture and Mechanic Arts seeks to aid the young men and women in the acquirement of a higher education. Instruction is given in the culture studies and sciences, together with such experimental work as to enable the students to successfully engage in a practical profession. Throughout the several courses, the study of the textbook is supplemented by lectures, discussions, library work, and the practical experimental work of the laboratory. The instruction is not merely theoretical but also practical—the student verifying and putting into practice in the laboratory the instruction received.

The Iowa State College offers thirteen four year courses leading to the following degrees:

Course in Agronomy, leading to the degree of Bachelor of Scientific Agriculture (B. S. A.).

Course in Dairying, leading to the degree of Bachelor of Scientific Agriculture (B. S. A.).

Course in Animal Husbandry, leading to the degree of Bachelor of Scientific Agriculture (B. S. A.).

Course in Horticulture and Forestry, leading to the degree of Bachelor of Scientific Agriculture (B. S. A.).

Course in Science and Agriculture, leading to the degree of Bachelor of Scientific Agriculture (B. S. A.).

Course in Veterinary Medicine, leading to the degree of Doctor of Veterinary Medicine (D. V. M.).

Course in Mechanical Engineering, leading to the degree of Bachelor of Mechanical Engineering (B. M. E.).

Course in Civil Engineering, leading to the degree of Bachelor of Civil Engineering (B. C. E.).

Course in Electrical Engineering, leading to the degree of Bachelor of Science in Electrical Engineering (B. S. in E. E.).

Course in Mining Engineering, leading to the degree of Bachelor of Science in Mining Engineering (B. S. in Mn. E.).

Course in Ceramics, leading to the degree of Bachelor of Mining Engineering in Ceramics (B. E. M. in Cer.).

Course in General Science, leading to the degree of Bachelor of Science (B. S.).

Course in Domestic Economy, leading to the degree of Bachelor of Science in Domestic Economy (B. S. in D. E.).

The degree of Bachelor of Agricultural Engineering (B. A. E.) is given to students who have completed a four year course in Civil, Mechanical, or Electrical Engineering, followed by one year's prescribed work approved by the faculty, in Agricultural Engineering and related sciences, under the rules and conditions governing work in other courses.

Two year courses are also offered in Mining Engineering and Clay Working, and a one year course in Poultry Husbandry, for the completion of which, certificates will be given. That many, who are unable to take the full college course, may take advantage of the advancement being made in their chosen work, a two weeks' short course is now offered each year during the winter vacation in Stock and Grain Judging and Dairying. A School of Good Road Investigations is also held during each summer vacation. The interest in all of these short courses is becoming greater, the attendance is increasing and the benefits to be derived from them are constantly increasing.

LOCATION.

The College occupies a delightful and healthful location upon high rolling land in the west part of Ames, Story County. Situated at the junction of the north and south branch and the main double-track line of the Chicago & Northwestern Railroad and connected with all the trunk lines of Iowa, Ames is easily accessible from all parts of the State. An electric railway connects Ames and the College with efficient service. Ames is a most desirable town for wholesome college influences. Its people are thrifty, enterprising and cordial. The town has an excellent system of public schools, numerous churches, water works, electric lights and a good city government. It is an inviting community for families who wish to educate their children, enjoy the better elements of society and an environment of reasonable expense. Ames and the College are on very cordial terms, and its citizens seek to promote the efforts of the students and the highest interest of the College.

THE COLLEGE GROUNDS.

Of the entire College domain of 1200 acres, 125 acres are set apart for College grounds. These include the experimental plots, the young forestry plantations, the surroundings of the professors' dwellings and the central campus with its beautiful winding walks and drives, its trees, shrubbery and flower gardens, and its large and stately college buildings. The true principles of landscape gardening have been so faithfully observed in the gardening and in the location of buildings and drives as to make the entire campus a large and beautiful park.

BUILDINGS.

Twenty-three commodious buildings have been erected by the State for the exclusive use of the various departments of the College, besides the dwelling houses and buildings for farm stock, machinery and work. All of these buildings are heated by steam, lighted by electricity, and supplied with pure water.

New Central: The New Central Building which has been erected on the site of the Old Main accommodates the Executive Offices, the departments of English, Civics, Modern Languages, Economic Science, History, Mathematics, Public Speaking, Botany and General Bacteriology. The building is of buff Bedford stone, built in the Roman Renaissance style, which style has been adopted for the Central Building, and the Engineering and new Agricultural Halls. The building completed and furnished cost about \$375,000.00.

Engineering Hall: The Engineering Departments occupy the new Engineering Hall. This is a fire-proof building in which all the engineering departments have offices, recitation and lecture rooms, laboratories and engineering museum. It is of Bedford stone, has plate glass windows, and modern conveniences and furnishings throughout. This building, costing \$220,000.00, is the best engineering building west of the Mississippi river.

Agricultural Hall: This is a four story building, the lower stories of stone and the upper of brick. It contains recitation rooms of the divisions of Agriculture and Veterinary Science, offices of the Experiment Station and sewing rooms of the Domestic Economy department.

Morrill Hall: Morrill Hall, one of the oldest of the College buildings, was named in honor of Hon. Justin S. Morrill, the originator of the "Land Grant" for Colleges of Agriculture and Mechanic Arts. It is of deep red brick with stone, brick and terra cotta trimmings. In it are the College Chapel, Library and Zoological Museum, lecture rooms and laboratories.

Margaret Hall: Margaret Hall, the home of the young women of the College, occupies one of the most pleasing locations on the campus. It is built of brick, roofed with slate, provided with steam heat, electric lights, baths and large parlor. The hall will accommodate about one hundred girls, to whom the rooms will be assigned in the order of their application. The privilege of rooming in Margaret Hall is reserved for regular students. In connection with the hall there are two clubs at which the girls may obtain board at a reasonable rate. The young women are under the direction of an efficient dean of women. The department of Domestic Economy is also located in this building.

Dairy Building: This is a three story building built of pressed brick, trimmed with Bedford stone containing factory butter and cheese

rooms, bottling room, refrigerators, lunch room, offices, research laboratory, farm dairy room, students testing laboratory, lecture room, dairy reading room, and bacteriological laboratory for research and investigation.

Chemical Hall: A three story brick building furnished with steam heat, water, gas and laboratory equipment accommodating 600 students in Chemistry.

Station Barn: The Experiment Station barn is one of the best and most modern buildings of its kind to be found anywhere in the world. It is veneered with buff pressed brick, has a slate roof, paved brick floors and is in every respect entirely fire proof. The building is devoted to the housing of beef and dairy cattle and horses, for storage of vehicles and machinery, storage and grinding room for feed, seed rooms for the drying of corn and the storage of grain and feed stuffs used in experimental work.

Judging Pavilion: In connection with the experimental barn is a two story octagonal judging pavilion. It is built of buff pressed brick with a slate roof. The lower story is used for stock judging, and the upper for grain judging. This building, thoroughly equipped in every way, is conceded to be the best building of its kind on the continent.

Horticultural Laboratory: This is a two-story brick building connected with the greenhouse. The main floor, accommodating fifty students, is especially fitted for the study of fruits. The building is equipped with two refrigerators, one for experimental work in cold storage and the other for storing fruits for class purposes. The second floor contains the horticultural museum and facilities for photography.

Greenhouses: The present plant contains 10,000 square feet under glass. The houses are of cypress construction, supported by a steel structure. They are heated by steam, operated on the Paul system, with varying temperatures for the propagating house, growing houses, and seed testing houses. The houses also include four commodious work rooms used in potting, transplanting and other necessary work.

Agricultural Engineering Building: This is a four story, fire proof building, built of steel and pressed brick, costing when equipped about \$70,000.00. It accommodates the workshops, tool rooms, blacksmith shop, carpenter shop, drafting room, reading room, rooms for the study and exhibition of various farm implements, offices and class rooms, bulletin rooms and a photographic department.

Engineering Laboratory: This is a brick four story building, including basement and large "L," containing machine shops, and the engineering laboratory for the departments of Civil and Mechanical Engineering.

Wood Shop: This is a brick building containing carpenter and pattern shops, with power and hand tools complete for wood work, and outfit of tools for individual work.

Forge Shop and Foundry: A brick building containing complete equipment for forging and moulding.

Power House: This is a brick, one story building, containing the dynamos and motor power for electrical engineering, the deep well pump, the engine and boiler furnishing power for the shops, and also accommodates the experimental work in the course in Mechanical Engineering.

Veterinary Hospital: This is a brick, three story building, containing offices and dissecting rooms, and is well equipped for conducting clinical as well as general hospital work.

Horse Barns and Stock Pavilion: The barn, built of brick with a slate roof, is for horses, the storage of grain and general farm purposes. The Stock Pavilion is also of brick, is circular in form, well heated and lighted, accommodates several hundred students at a time, and affords first class advantages for stock judging and animal husbandry.

Locomotive Laboratory: This building contains an eight-wheeled locomotive and tender presented by the Chicago & Northwestern Railway Company.

Sanitary Hall: A frame, two story building, containing offices, kitchen and dining room for the hospital patients, and rooms for the sick and convalescent.

Music Hall: This is a brick, two story building, fitted up with apparatus and instruments for practice and instruction.

Dwelling Houses: There are also on the Campus eighteen comfortable dwelling houses occupied by professors' families, and several others by foremen and employees.

Other Buildings: Stables, barns, sheep and swine and seed houses sufficient for the requirements of the farm, are conveniently grouped near the College campus.

ADMISSION TO THE COLLEGE

Methods of Admission.

Students are admitted upon the presentation of a certificate from schools or colleges, or by examination at the College.

Admission by Certificate.

Students entering the Freshman class by certificate from accredited high schools or colleges must present specific certificates showing amount and grade of work done and text-books used in the subjects required for entrance. Such certificate showing the successful completion of the amount of work required in the various subjects for entrance to the College will be accepted and the student admitted to the Freshman class without examination.

Superintendents and Principals are urged to send to the College immediately upon the close of the school year the Uniform Admission Certificate of each graduate intending to enter the College at the beginning of the ensuing College year. If on inspection the certificate is found satisfactory the applicant will be forwarded a certificate entitling him to admission without examination. Uniform Admission Certificates may be had by teachers and students upon application.

Graduates of schools fully accredited by other colleges which have as high a standard of entrance requirements as this institution will also be admitted as Freshmen upon presentation of certificates of graduation, accompanied with Uniform Admission Certificate.

College Credit for Work Done Elsewhere.

Graduate and under-graduate students of other colleges will be admitted and granted such credits as their work will justify. Work of recognized merit that has been taken at other colleges or universities of good rank and standing will be credited for an equivalent amount of work so far as it applies in any of the courses offered in this college. Credits allowed, may at the option of the heads of departments, be conditioned on satisfactory work during the student's first semester in college.

The following form should be used by those seeking advanced credits:

.....College

Date,

THIS IS TO CERTIFY, That of has
been a student in College, and has the following
grades on the records of this institution:

Name of Subject	Name of Text-book Used, or Lecturer	No. of Weeks Pupil Studied Subject in This class	Grade	No. of Recitations Per Week

Remarks.

Amount and kind of Laboratory work

.....
PRESIDENT OR RECORDER.

Adult Special Students are admitted in accordance with the provisions found under Special Students. See Index.

Admission by Examination.

Students desiring to enter by examination will be given such examinations upon any subject required for entrance upon presentation of satisfactory evidence of having devoted sufficient time in the preparation of such subjects.

Examinations for entrance to College will be conducted at the opening of each semester on the Tuesday and Wednesday preceding classification.

Entrance Examination Periods:

Tuesday.

8-10 A. M.—Public Speaking. Room 308, Central Building.

10-12 A. M.—English. Rooms 1 and 3, Central Building.

1-3 P. M.—Language. Room 119, Central Building.

3-5 P. M.—Botany. Room 312, Central Building.

Wednesday.

8-10 A. M.—Mathematics. Room 221, Central Building.

10-12 A. M.—History. Room 208, Central Building.

1-3 P. M.—Civics. Room 102, Central Building.

3-5 P. M.—Language. Room 119, Central Building.

The Freshman work will be of such grade that a graduate of an accredited school can reasonably be expected to be prepared to carry it creditably. All students are urged to review thoroughly at high school or elsewhere Algebra and English Grammar just before entering. Diplomas of graduation will not be accepted for entrance unless accompanied by certificates as stated above.

ENTRANCE REQUIREMENTS.

The requirements for admission are stated in terms of credits. The term credit means the equivalent of five forty or fifty-minute recitations per week in a given subject for a term of eighteen weeks, adequate time being given to the preparation of each lesson.

Students desiring admission to the Freshman year must present thirty credits. Of these, certain are required and the balance elective, as stated below under requirements for admission to the several divisions of the College.

A. The following 17 credits are required of all entering the courses in Agriculture, Engineering and Science:

Mathematics,	Credits
Algebra	3
Geometry, plane.....	2
English	6
History	2
*Foreign Language	
German, French, Spanish or Latin..	4

B. Electives.

Agriculture, Elements of.....	1
Astronomy	1
Bookkeeping	1 or 2
Botany	1 or 2
Business Arithmetic.....	1 or 2
Chemistry	1 or 2
Civics	1 or 2

*Students may be admitted without Foreign Language under the following conditions:

1. The student must offer all of the required credits except the four in Foreign Language, together with sufficient elective credits to make a total of thirty.
2. The language requirements must be made up before graduation. It will ordinarily require, if taken in College, extra work to the extent of five hours a week for one year. This extra work will not be credited as part of the credit hours required for graduation in the several courses. Opportunity for making up deficiencies in language will be offered by the College.

Commercial Geography.....	1
Drawing, freehand or perspective	1 or 2
English	1 or 2
Geology	1 or 2
German	2 or 4
Greek	2 or 4
History	2 or 4
Latin	2 or 4
Manual Training.....	1, 2 or 3
Mathematics	1 or 2
Mechanical Drawing.....	1, 2 or 3
Mental Arithmetic.....	1
Optional	2
Physics	2
Physical Geography.....	1 or 2
Physiology	1 or 2
Political Economy	1 or 2
Spanish	2 or 4
Stenography	1 or 2
Zoology	1 or 2

Limitations. Not more than four elective credits will be accepted in Foreign Language or any other one subject. No Foreign Language course of less than two credits will be accepted from students presenting only one foreign language.

Optional Subjects. An optional subject is any subject of the student's high school course not specified in the list of elective subjects.

REQUIREMENTS FOR ADMISSION TO THE AGRICULTURAL DIVISION OF THE COLLEGE.

Division of Agriculture.

Required Credits:

Algebra	3
Geometry, plane.....	2
English	6
History	2
*German, French, Spanish or Latin...	4
Science	1
	18

Elective Credits:

The remainder of the thirty necessary credits must be made up by elections from B. Electives.

ACADEMIC CLASSES.

For the accommodation of graduates from the smaller high schools of the state which offer only three years of work, and for other students who have had equivalent preparation elsewhere, this institution offers instruction in Academic classes in certain of the studies mentioned under (A) required credits, and also in certain elective credits. These subjects are here listed with a statement of the registered number of the course, the hours, and the semester in which the same are offered:

COURSE	NAME OF SUBJECT	HOURS CREDIT	SEMESTER TAUGHT	LEADING TO COURSE IN
Botany 1	Elementary Botany...	2	First.....	Agricultural
Civics 1.....	Government in State and Nation.....	2	First and Second ..	Civil Engineering and Science
Civil Engineer- ing 2.....	Field Work.....	1	First.....	Civil Engineering
Civil Engineer- ing 1.....	Lettering.....	1	Second	Civil Engineering
English 1.....	Grammar.....	5	First and Second ..	For Academic Admission
English 2.....	Rhetoric and Compo- sition.....	5	First and Second ..	All Four Year Courses
History 1.....	English History.....	5	First.....	For Academic Admission
History 2....	Advanced American..	4	First and Second ..	Science
History 16....	National Period.....	3	First and Second ..	Agricultural and Engineering
Language 1...	French	5	First.....	All Four Year Courses
Language 2...	French	5	Second	All Four Year Courses
Language 5...	German	5	First.....	All Four Year Courses
Language 6...	German	5	Second	All Four Year Courses
Language 30...	Spanish	5	First.....	All Four Year Courses
Language 31...	Spanish	5	Second	All Four Year Courses
Literature 12..	English Classics.....	4	Second	Agricultural and Engineering
Mathematics 1	Algebra	5	First and Second ..	For Academic Admission
Mathematics 2	Algebra	5	First.....	All Four Year Courses
Mathematics 3	Algebra Review.....	5	First and Second ..	All Four Year Courses
Mathematics 5	Plane Geometry.....	5	Second	All Four Year Courses
Mathematics 6	Solid Geometry	3	Second	Engineering
Mechanical Engineering 19	Freehand Drawing....	1	First.....	{ Mechanical Engineering
Mechanical Engineering 29	Manual Training.....	1	Second	{ Electrical Engineering
Mining Engineering 20	Elements of Mining...	1	First.....	{ Mechanical Engineering
Mining Engineering 21	Elements of Mining...	1	Second	{ Electrical Engineering
Public Speak- ing 2	Declamation.....	2	First and Second ..	Mining Engineering
				Agricultural

The Chairman of the Entrance Requirement Committee and the College Registrar shall have authority to determine the value of preparatory credits submitted, and notify applicants of assignment in course. Such assignments will be conditioned on the students doing creditable work.

Any student who at entrance presents satisfactory credit for part of the Academic course, or who by examination passes part of it satisfactorily, will be classified in such of the remaining work offered in the Academic year as the Dean of the Junior College and the Dean of the Division in which the student is enrolled shall consider will best prepare him for his college course. After providing in such classification for the re-

mainder of the 30 credits required for entrance to college, the student may complete his schedule by taking up some of the Freshman studies.

Completion of the Academic work will not entitle the student to enter the Freshman class unless he presents the 30 semester credits regularly required for entrance, as already stated, not more than $7\frac{1}{2}$ such credits being allowed for any year of the work of a secondary school. Inasmuch as the high school period is from forty-five to fifty minutes and the college period sixty minutes, the Academic course will be counted as $7\frac{1}{2}$ credits.

Opportunity will be offered during the four weeks winter vacation whereby students deficient in Mathematics, English, or Modern Language, can take up some work in these lines under private tutors.

ENTERING IN JANUARY.

Students may enter the State College in the academic course, at the opening of the second semester, in January as advantageously as in the fall. Many students find it desirable to begin their studies in College in the second semester. Those who have had no considerable algebra in the preparatory school should review its fundamental principles and become acquainted with its application in the wider and more difficult field of college work, and those who have had experience in plane geometry can, to advantage, supplement such study by a review of some standard text and a thorough drill in original geometric propositions. The classes established at the beginning of the spring semester furnish an excellent opportunity for students to prepare themselves thoroughly for entering upon collegiate work at the opening of the next college year.

SPECIAL STUDENTS.

Students taking special work in any of the college courses must be at least twenty years of age, must give good and satisfactory reason for desiring such classification and must furnish satisfactory evidence that they are thoroughly prepared to pursue the work chosen. Permission to take such special course and the subjects included therein must receive the approval of the President of the College and the Dean or Head of the Department in which the student seeks enrollment.

Special students when not qualified to enter above the Freshman year, will be required to take the first year of their work from Junior College studies.* During the second year they may be admitted to the Senior College studies in accordance with the rules governing admission to each study or course.**

Special students are subject to the same rules governing conditions on back work that apply to all other students. Students wishing to change from a regular to a special course either in the same or another department will be required to remove conditions on back work. Special students, as well as regular students, are subject to the conditions given under "Entrance."

It is the theory of special classification that students should be particularly strong and well prepared to do thorough work in the studies they elect. A high standard of scholarship will, therefore, be required of all who are thus classified.

***Special Interpretation for Agricultural Students.**—An exception to this rule will be made in case of Animal Husbandry 11 and 12, which may be taken the first year in lieu of Animal Husbandry 2 and 3, which cannot be taken until the work in Animal Husbandry 1 and 2 has been completed.

****For conditions of admission to any course, see the description of the course of study.**

FEES AND EXPENSES.

The entire expenses of a student need not exceed \$250.00 per College year.

Tuition.—No charge for tuition is made to the students from the state of Iowa. To the non-residents, a tuition fee of \$50.00 per year is charged.

Janitor Fee.—The regular janitor and incidental fee for the semester is \$10.00, but all students who classify during the classification period, Thursday, Friday and Saturday before College work begins, will be charged a janitor fee of only \$8.00 per semester.

Laboratory Fees.—Laboratory fees at the actual cost of breakage and usage are charged to the students, the Treasurer's receipt for such fee being required before the students are admitted to laboratories. For the amount of such fees see the department courses.

Board and Room.—About one hundred young women can secure rooms in Margaret Hall. The privilege of rooming in this building is reserved for regular students. Students rooming in this building furnish their own bedding and all furniture except bedsteads, dressers, and tables. Each girl pays \$5.00 per semester for room and a sum not exceeding 55 cents per week for lighting, heating and incidentals.

All other students can secure furnished rooms and board in clubs or private families adjacent to the College grounds at from \$3.50 to \$4.50 per week.

The College Custodian, office in old office building, should be consulted by all new students concerning rooms and rooming places, that undesirable rooms and houses may be avoided. The College authorities reserve the right to forbid students rooming in any particular house for sanitary or any other reasons.

No group of young women students may establish a "house" or "home" without the full knowledge and approval of the President and the Dean of Women, nor make any definite plans in such direction. No young woman may become a resident of a sorority house until after she is an initiated member of the sorority.

Hospital Fee.—All students living in College buildings and such others as desire to, pay a Hospital fee of \$2.50 per semester. (See College Hospital.)

Diploma Fee.—A diploma fee of \$5.00 is payable before graduation.

Text Books.—All text books and stationery may be purchased at the College Book Store at about twenty per cent below the average retail price.

As security for the payment of bills, all students living in College buildings are required to deposit \$10.00 with the Treasurer, which deposit will be returned at the final settlement at the close of the semester. All the bills for each month must be settled at the Treasurer's office by the second Saturday of the next month.

ENTRANCE.

The office will be open for registration at 8:00 A. M. on the Thursday preceding the opening of each semester. All students are required to register as soon as possible.

Students who are required to take the entrance examinations will be examined here the Tuesday and Wednesday preceding classification days. After passing the examinations, the examination card should be taken to the classifying committee who give a card of classification which admits to college and assigns to class work. The student's name is at once entered upon the official list and will be included in the roll call of the following day. Attendance is expected thereafter at every recitation of the semester.

CLASSIFICATION AND STANDINGS.

The amount of work in each course is expressed in hours, *an hour* meaning one recitation or its equivalent per week throughout the semester. It is considered that one hour's recitation or lecture will require as much time in the preparation, and hence is equivalent and receives an equal credit with a three hour laboratory.

Number of Hours.—No student shall be allowed to classify in more hours than are specified in the catalogue for the semester of the course taken unless he has an exceptionally high record in his previous college work. The taking of such additional work is subject to the approval by the Dean under whom the student is classified and the Head of the Departments in which the student is classified.

In general, students failing in any portion of a term's work will not be allowed to take full classification for the next semester.

Classification.—No student shall be admitted to or dropped from any class except by authority of the Classifying officer.

Standings.—All the standings are based on the scale of 100. The passing grade is 75. A student receiving between 60 and 74 per cent

inclusive in any course is conditioned and allowed to make up the condition under the direction of the head of the department. A student receiving below 60 per cent in any course is not passed in that course.

Back Studies.—Students shall be classified in back studies in all cases in which such studies are taught, subject to the first rule under Numbers of Hours. Any exception to this rule must be for good and sufficient reason approved by the President of the College and the Dean or Head of the Department in which the student is enrolled.

No student shall be considered a candidate for graduation who has not at the beginning of the second semester of the Senior year completed his work to within the maximum number of hours regularly allowed in his course for that semester. If the uncompleted work is not offered in the second semester it shall be passed and reported to the recorder not later than April 1st.

EXAMINATIONS.

Examinations for back work for matriculated students will be conducted at the opening of each semester, on the Tuesday and Wednesday preceding classification days.

TUESDAY.

8-10 A. M.—Farm Crops.....Farm Crops Lecture Room, Ag. Hall
 8-10 A. M.—Mining Engineering.....Room 306, Engineering Hall
 8-10 A. M.—Zoology.....Zoological Lecture Room
 10-12 A. M.—English.....Rooms 1 and 3, Central Building
 10-12 A. M.—Civil Engineering.....Room 312, Engineering Hall
 1- 3 P. M.—Mech. Engineering.....Rooms 204 and 205, Eng. Hall
 2- 4 P. M.—History.....Room 208, Central Building
 3- 5 P. M.—Public Speaking.....Room 308, Central Building
 3- 5 P. M.—Electrical Engineering.....Eng. Hall, Room 207

WEDNESDAY.

8-10 A. M.—Horticulture.....Hort. Lecture Room, Agr. Hall
 8-10 A. M.—Chemistry.....Chemical Hall, Room 29
 8-10 A. M.—Mathematics.....Room 221, Central Building
 8-10 A. M.—Animal Husbandry.....An. H. Lecture Room, Agr. Hall
 10-12 A. M.—Economics.....Room 222, Central Building
 10-12 A. M.—Dairying.....Dairy Building
 10-12 A. M.—Botany.....Room 312, Central Building
 1- 3 P. M.—Civics.....Room 102, Central Building
 1- 3 P. M.—Mech. Engineering.....Rooms 204 and 205, Eng. Hall
 1- 3 P. M.—Domestic Economy.....History of Art Room
 2- 4 P. M.—Modern Language.....Room 119, Central Building
 2- 4 P. M.—Agricultural Eng....Agr. Eng. Lecture Room, Agr. Hall
 3- 5 P. M.—Soils.....Soils Lecture Room, Agr. Hall
 3- 5 P. M.—Physics.....Room 207, Eng. Hall

Conflicts.—Students shall not classify in conflicting studies without the approval of the Classifying officer and Heads of the Departments in which the student wishes to enroll.

Junior and Senior College.—The students are now classified in "Junior and Senior Colleges." The Junior College is composed of all students in the Academic, Freshman and Sophomore years: the Senior College, of all in the Junior and Senior years.

GOVERNMENT.

The relations of our College buildings, and the nature of the exercises, complicated as they are, by laboratory work, shop practice and labor, make order, punctuality and systematic effort indispensable. The institution, therefore, offers no inducement to the idler or the self-indulgent. All who are too independent to submit to needful authority, too reckless to accept wholesome restraint or too careless to take advantage of their opportunities, are not advised to come. The discipline of the College is confined mainly to sending away those who prove, on fair trial, to be of this class.

MANUAL LABOR.

The following regulations in regard to manual labor have been adopted by the Board of Trustees:

1. The manual labor of students is divided into two kinds, viz: Uninstructive labor, which shall be paid for in money, and instructive labor, which shall be compensated by the instruction given and the skill acquired.

2. Uninstructive labor shall comprise all the operations in the workshop, the garden, upon the farm and elsewhere, in which the work done accrues to the benefit of the College, and not to that of the student. Instructive labor shall embrace all those operations in the workshop, museum, laboratories, veterinary hospital, experimental kitchen, upon the farm, garden and experimental stations, in which the sole purpose is the acquisition of knowledge and skill.

3. Students shall engage in instructive labor in the presence and under the instruction of the professor in charge according to the statement made in each of the courses of study.

The compensated labor furnished by the Divisions of Agriculture, Veterinary Medicine and of Engineering, is given by each to its own students and is eagerly sought. The "details" of compensated labor supplied by the needs of the various departments are given to the most faithful and meritorious students in each department. Uninstructive labor is paid for according to its value to the College, but no student should expect to pay the main part of his expenses by labor while here. The College cannot furnish the work, and even if it could, the student's time is *chiefly needed for study*. Still, many worthy and industrious students pay a considerable part of their expenses by labor, over \$4,000 being paid out by the College thus each year to students and post-graduate assistants.

GRADUATING THESIS.

All candidates for graduation in the Engineering and Agricultural courses are expected to present a satisfactory thesis.

The subjects for theses shall be selected under the direction of the professor in whose department they are written, and submitted to the

Thesis Committee, with signed approval of the professor, on or before the first Monday in October.

It is expected that each thesis shall represent an amount of work equivalent to at least one exercise per week through the Senior year; that it shall show the result of the student's personal study or investigation and be throughout original in matter and treatment so far as the nature of the subject will permit; that it shall be prepared under the supervision of the professor in charge, the student making frequent reports of progress and having an outline of matter ready for approval by the first week of the last semester.

The complete thesis shall be submitted to the Thesis Committee on or before May 25th.

POST GRADUATE COURSES.

The faculty of this College offers the degree of Master of Scientific Agriculture (M. S. A.) to Bachelors of Scientific Agriculture who are graduates of this College or others offering equivalent courses of study, the degree of Master of Science (M. S.) to Bachelors of Science who are graduates of this College or other colleges offering equivalent courses of study, the degree of Master of Agricultural Engineering (M. A. E.) to Bachelors of Agricultural Engineering who are graduates of this college or other colleges offering equivalent courses of study, and also Professional degrees in Engineering.

MASTER'S DEGREE.

The opportunity for resident study after graduation is a privilege granted only upon the recommendation of the President with the advice and consent of the Committee on Post-Graduate Study and the professors in charge of the departments in which the studies are to be pursued.

The candidate shall spend at least one academic year in residence. If only one year is spent in residence, the candidate shall devote his entire time to his post-graduate studies, except in cases where work previously done *in absentia* is accepted at the beginning of the students' residence by the Professor in charge of the major subject; such *in absentia* work shall constitute not more than one-half of the required work. In the case of graduates of this college, temporary leave of absence may be granted during the year's residence for special study elsewhere. In order to be entitled to his degree, the candidate must meet within four years the requirements existing at the time of matriculation, otherwise he must complete any additional requirements which may be in force at the time of his final examination.

Two lines of work shall be selected, designated as major and minor studies, the former to be given two-thirds and the latter one-third of the time. The major study shall be research work, the results of which shall be incorporated in a thesis.

The major and minor studies shall be so selected as to support and strengthen each other.

No under-graduate study shall be selected as a major study. Under-graduate studies may be taken for part of the minor work only with the approval of the Committee on Post-Graduate Study, and the heads of the departments in which the work is to be done.

The candidate shall have a reading knowledge of French or German.

Application for graduate study, specifying the departments in which the major and minor subjects are to be taken, shall be filed with the President within four weeks of the beginning of the first term's resident work, which, in all cases, shall be not later than October 1st, next preceding the commencement at which the degree is to be granted.

A detailed outline of the work to be done in the major and minor subjects approved by the heads of the departments in which the work is to be taken shall be filed with the Committee on Post-Graduate Study, within eight weeks of the opening of the semester in which resident work is begun.

The candidate for the master's degree shall apply in writing for examinations not later than May 1st, and such examinations shall be given not later than May 15th.

Graduates of other institutions desiring to become candidates for post-graduate degrees in this institution shall be required to show to the Committee on Post-Graduate Study evidence of under-graduate work equivalent to the corresponding course in this institution, and if any deficiency appears in the subjects elected for post-graduate work, to make up such deficiency.

Candidates for advanced degrees are expected to appear on the Commencement stage to receive such degrees.

PROFESSIONAL DEGREES IN ENGINEERING.

The several departments of the Division of Engineering confer the following professional degrees: In Mechanical Engineering, the degree of Mechanical Engineer, (M. E.); in Civil Engineering, the degree of Civil Engineer, (C. E.); In Electrical Engineering, the degree of Electrical Engineer, (E. E.); In Mining Engineering, the degree of Mining Engineer, (E. M.).

Applications for professional engineering degrees will be received from graduates of the engineering departments of this College or from other colleges offering equivalent courses of study in engineering.

To be entitled to the professional degree, the applicant therefor shall have devoted not less than one year to resident study along lines satisfactory to the engineering faculty, shall have been engaged for not less than one year in a responsible professional position, and shall present a satisfactory thesis, or he shall have been engaged for not less than five years in a responsible professional position and shall present a satisfactory thesis.

In this connection a responsible professional position means practical engineering experience, requiring the exercise of skill or executive ability in designing or construction work. References or personal knowledge of the facts will be required by the engineering faculty.

Further information as to the lines of work open to graduate students can be found under the courses of study described elsewhere.

COLLEGE HOSPITAL.

The actual sanitary condition of the College is excellent. The buildings are situated on high ground with good natural drainage. The water supply is exceptionally pure and abundant. The sewer system and sewerage disposal plant are the best that modern sanitary engineering can devise. Nevertheless in this, as in other like institutions, whose students are drawn from a wide territory, various diseases are brought here by the students themselves. In order to control epidemics and properly care for other cases of illness or injury, two hospitals are provided. These hospitals are under the charge of the College Physician, assisted by a professional nurse, a competent house-keeper, and a student hospital steward.

The expenses of the hospitals are defrayed from a fund accruing from the hospital fees paid by students.

A hospital fee of \$2.50 per semester is required of all students living in College buildings.

The privileges of the hospitals are also extended to students not rooming in the College buildings, provided, 1st, that the physician shall be paid for calls at their residences, and 2nd, that the usual hospital fee shall be paid within the first ten days of the student's arrival.

Students not making the hospital deposit will be admitted to the hospital upon the basis of \$10.00 per week, within the discretion of the college physician.

The hospital fee insures to the payer thereof, medical attendance, nursing and medicine in illness or accident, and consultation and medicine for minor ailments in accordance with the regulations herein published.

The charges named are based upon the probable actual cost of medical attendance and hospital service, and the fund created is carefully devoted to these purposes. The College can not assume any liability beyond the extent of the fund so created. The hospital has proved to be a great blessing to the students.

The following regulations apply to the privileges of the hospital:

1st. Students entering the hospital shall be charged \$3.00 per week for board, room, light and heat. But for any time in excess of three consecutive weeks per term spent in the hospital an additional charge above that mentioned shall be made of \$4.00 per week.

2nd. In case a special nurse or physician is employed, the expense shall be borne by the particular patient, the selection of such nurse or physician to be approved by the College physician.

3rd. The College assumes no responsibility whatever nor shall the privileges of the hospital be extended to cases of smallpox.

4th. The President and College physician may require of students entering the college a certificate of a reputable physician showing successful vaccination.

5th. The College physician is authorized to exclude from the College dormitories and recitation rooms any person afflicted with a contagious disease.

COLLEGE LIBRARY.

The College Library, consisting of over 23,400 volumes and about 6,000 pamphlets, is chiefly a library of reference, containing standard and technical works bearing particularly upon the lines of study pursued in the College. Magazines, periodical literature bearing upon the special work of the students, and daily papers are furnished for the use of the students. The reading room of the library is open thirteen hours daily except Sunday, when it is open four hours. Personal assistance will be given by the librarian and assistant to any who desire help in reference work.

This year the College received by bequest about 1500 volumes pertaining to Engineering and Economics from the library of the late Geo. W. Catt. This Engineering Library with that section of books from the general collection has been made a Departmental Library located in Engineering Hall.

RELIGIOUS LIFE AT THE COLLEGE.

Although a state school, and hence non-sectarian, the College life is dominated by religious influences.

The Young Men's and Young Women's Christian Associations, Bible Study Classes, and Mission Classes, consisting of members from both faculty and student body have a helpful influence not only upon the religious but upon the social life of the College. The members of the Associations assist in the reception of the new students and in the maintenance of religious work.

The work of each Association is under the direction of a general secretary. These two Associations are now located in their new home, "Alumni Hall," which was constructed at an expense of \$60,000.00 by funds donated by the Alumni, students, instructors, citizens and friends. This home is the center of the religious and social life of the College and as a building for such purposes it is not excelled in the West.

The faculty and students assemble daily in the Chapel at 9:40 A. M. for public worship. On each Sunday morning at 10:45, Chapel exercises are conducted by some prominent clergyman invited for the occasion. In all these services, the object is to emphasize and enforce the principles of morality and of the Christian religion.

There are nine different denominational churches in Ames, all of which are closely in touch with and cordially invite the students to coöperate with them in all of their religious services.

ALUMNI ASSOCIATION.

The Alumni Association of the Iowa State College was organized in 1876. Its purpose is to promote the highest interest of the institution and to increase the friendship and sympathy among the students and alumni.

The present officers of the association are: E. W. Stanton, '72, Honorary President; R. B. Swift, '90, President; Mrs. Olive W. Curtiss, '87, Secretary; L. C. Tilden, '88, Treasurer; and Mrs. Mary McDonald Knapp, '83, Historian. The annual business meeting and banquet are held on Wednesday and Thursday of Commencement Week. A local association was organized in April, 1903, in order to arrange for the annual meetings and to keep the alumni in close touch with one another. Branch associations have been organized in Des Moines, Washington, D. C., New York, Pittsburg, Chicago, Philadelphia, Schenectady and St. Louis.

The Alumni Hall adds much to the association, as it affords a place where all alumni can meet when visiting their Alma Mater.

COLLEGE PUBLICATIONS.

1. Catalogue, published in February, and giving general information about the College and its several departments.
2. College Compendium, an illustrated catalogue of the school.
3. Special announcements of the Agricultural, Veterinary and Engineering divisions, and of the Short Course and Good Roads School, one bulletin being published each month.
4. Bulletins recording the results of experimental studies carried on by the Agricultural and Engineering Experiment Stations.
5. Iowa Engineer, published bi-monthly by the Engineering Department of the College.
6. The Alumnus, a monthly publication, devoted to and published by the Alumni Association.

STUDENT PUBLICATIONS.

1. The Student, a weekly paper, published by a staff elected from the student body and devoted to the recording of such matters as pertain to the interest and welfare of the school.
2. The Bomb, an annual published by the Junior Class.
3. Iowa Agriculturist, published monthly by the Agricultural Club of the Iowa State College.

LITERARY SOCIETIES.

The work of the nine literary societies serves not only to supplement the social and literary work of the College, but also aids the student in securing that training so necessary to enable one to appear before an audience, the training which every student needs and which cannot be secured in the class room alone. It is the purpose of the officers of the College to keep each Friday evening open that the work of these societies may go on without interruption. Every student is invited and urged to join one of these societies.

DEBATING LEAGUE.

The Debating League is an organization composed of the Bachelor, Crescent, Phileleutheroi, Philomathian, Pythian, Welch and Forum literary societies. Its function is to arrange for and carry out debates, both inter-society and inter-collegiate. There is an inter-society debate each semester, calling out four students from each society. Of these four students, two maintain the affirmative and two the negative, of the same proposition on the same night against opposing teams from other societies. During the year the inter-society contests give opportunity for forty-eight students to engage in vigorous debate and many others get practice in trying to win a place on their society teams. During the fall semester a debate is held with the Iowa State Normal School. Hereafter we will support a dual debate, thus calling out six debaters from each school. The triangular inter-collegiate debate with Drake University and Iowa College held during the spring semester also calls for six students to represent the Iowa State College. The debates arouse great interest, and to the participants, they bring great profit.

ORATORICAL ASSOCIATION.

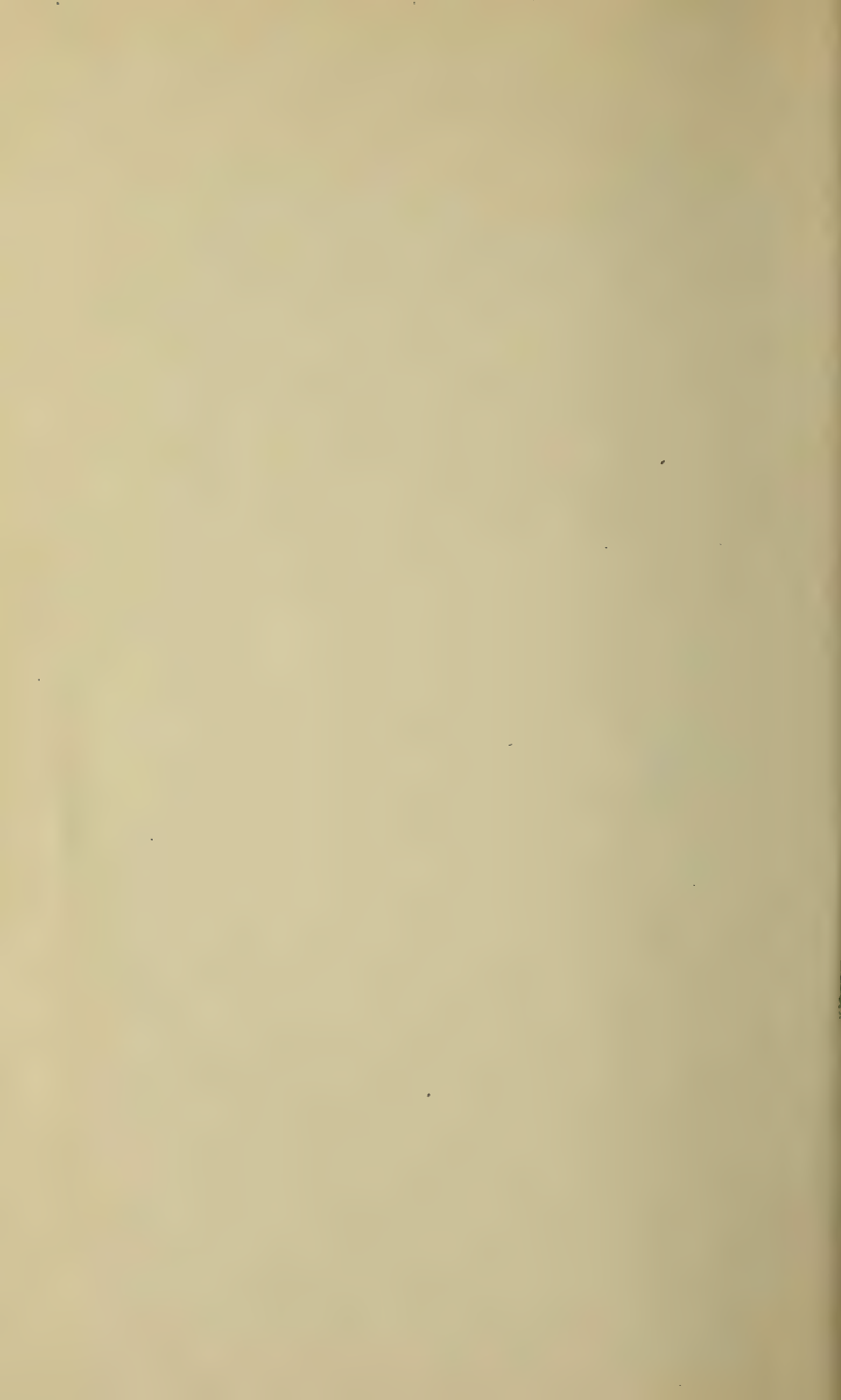
The Oratorical Association is composed of three members from each of the literary societies and three from the faculty. This association, by providing for joint public programs, declamatory and oratorical contests, and society graduation, helps to increase the interest in the general literary work of the school.

Inter-society oratorical contests are held each fall semester and declamatory contests each spring semester, each society having one representative. The winner in the inter-society oratorical contest represents the College in the annual inter-collegiate contest in which Drake, Penn, Parsons, Upper Iowa University, Cornell, Des Moines, Coe, Lenox, Leander Clark, Tabor, Central University, Buena Vista College and Iowa State College are represented.

MUSICAL ORGANIZATIONS.

The College maintains a Choral Society, membership being open to students and citizens of Ames, a College Choir, a Male Glee Club, and a Ladies Glee Club, all of which give frequent concerts and recitals. The musical organizations are under the supervision of the Director of Music.

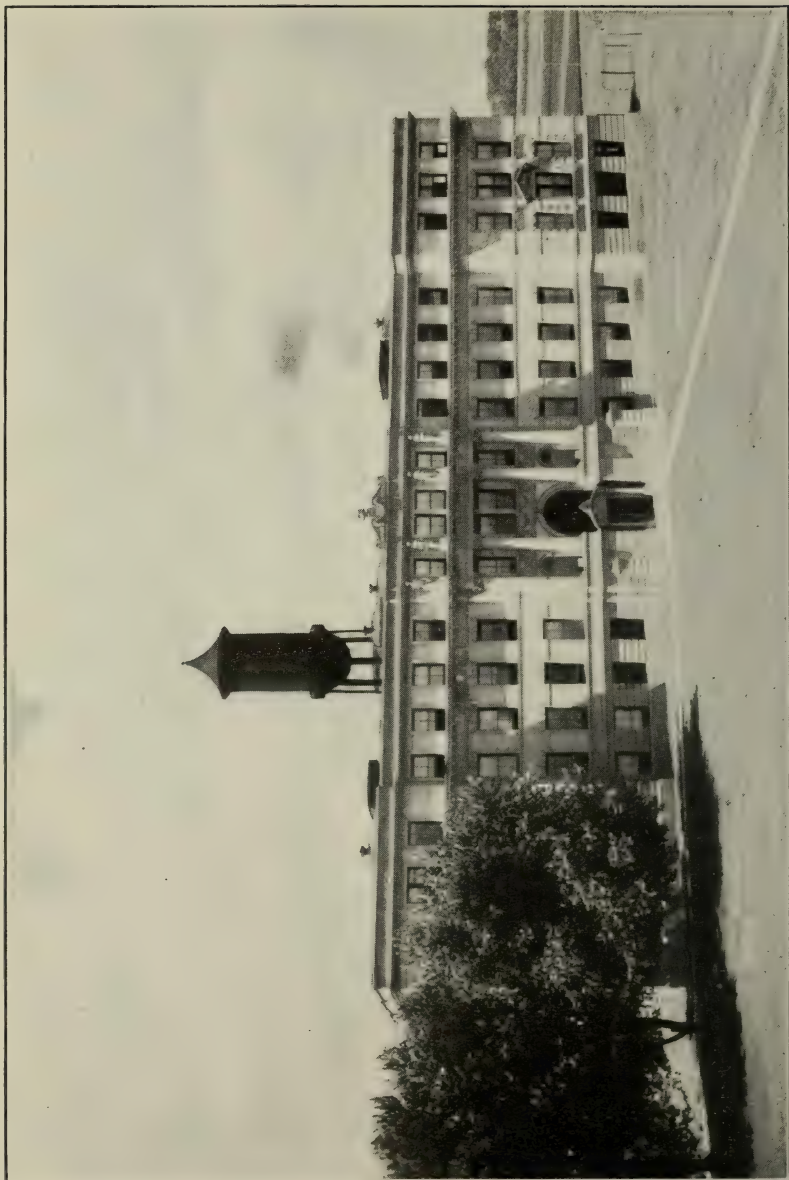
A College Band of thirty-two pieces is maintained under the instruction of Charles L. Mundhenk, a member of the Iowa State Band of 1893. This band furnishes music in connection with the Military Department and also for all athletic and student assemblies.



IOWA STATE COLLEGE
of
Agriculture
and **Mechanic Arts**



DIVISION OF ENGINEERING
1909-1910



ENGINEERING HALL

IOWA
STATE COLLEGE
OF
AGRICULTURE AND
MECHANIC ARTS



DIVISION OF ENGINEERING

MAY, 1909

AMES, IOWA

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Congress of July 16, 1904.

Calendar for 1909-1910

1909.

FIRST SEMESTER.

August 31, September 1, Tuesday and Wednesday	Entrance Examinations.
September 2, Thursday, 7:45 A. M.	First Semester begins.
September 2-4, Thursday, 8:00 A. M., to Saturday, 5:00 P. M.	Registration and Classification Days.
September 6, Monday, 7:45 A. M.	College Work begins.
September 11, Saturday, 8:00 P. M.	Y. M. C. A. and Y. W. C. A. Reception.
October 2, Saturday, 8:00 P. M.	Junior Trot.
October 4, Monday	Last Date for Presentation of Subjects for Bachelor's Degree.
October 16, Saturday, 8:00 P. M.	Sophomore-Freshman Annual.
October 21, Thursday	College Day.
November 25-27, Thursday to Saturday	Thanksgiving Vacation.
December 21-22, Tuesday and Wednesday	Semester Examinations.
December 22, Wednesday, 5:00 P. M.	College Work closes.

1910.

January 3-15, Monday to Saturday	Special Short Courses in Agriculture and Domestic Economy.
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1910.

SECOND SEMESTER.

January 18-19, Tuesday and Wednesday	Entrance Examinations.
January 20-22, Thursday, 8:00 A. M., to Saturday, 5:00 P. M.	Registration and Classification Days.
June 9, Thursday	Second Semester closes.

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ALBERT BOYNTON STORMS, A. M., LL. D.,
President, Dean of the Division of Science, 1903.*

EDGAR WILLIAMS STANTON, M. S., LL. D.,
Dean of the Junior College, Professor of Mathematics, 1877, 1874.

CHARLES FRANKLIN CURTISS, M. S. A., D. S.,
Dean of the Division of Agriculture, Director of Experiment Station, 1897, 1891.

ANSON MARSTON, C. E.,
Dean of the Division of Engineering, Professor of Civil Engineering, 1892.

CHARLES HENRY STANGE, D. V. M.,
Dean of the Division of Veterinary Medicine, Professor of Veterinary Medicine and Surgery, 1909, 1907.

HON. JAMES WILSON, M. S. A.,
Lecturer in Agriculture, 1902, 1891.

GENERAL JAMES RUSH LINCOLN,
Professor of Military Science, 1884, 1883.

ALFRED ALLEN BENNETT, M. S.,
Professor of Chemistry, 1885.

LOUIS HERMANN PAMMEL, B. Ag., M. S., Ph. D.,
Professor of Botany and General Bacteriology, 1889.

MISS LIZZIE MAY ALLIS, A. M.,
Professor of Modern Languages, 1896.

LOUIS BEVIER SPINNEY, B. M. E., M. S.,
Professor of Physics and Electrical Engineering, 1897, 1893.

SAMUEL WALKER BEYER, B. S., Ph. D.,
Vice Dean of the Division of Engineering, Professor of Geology and Mining Engineering, 1898, 1891.

ALVIN BUELL NOBLE, B. Ph.,
Professor of Rhetoric and Literature, 1898.

*First date after the title indicates the date of appointment to present position, the second date, when the first fails to do so, indicates the date of first appointment in the college.

HENRY ELIJAH SUMMERS, B. S.,
Professor of Zoology, 1898.

ORANGE HOWARD CESSNA, A. M., D. D.,
Professor of History and Psychology, 1900.

WILLARD JOHN KENNEDY, B. S. A.,
Professor of Animal Husbandry, 1901.

WILLIAM HENRY STEVENSON, A. B., B. S. A.,
Professor of Soils, 1903, 1902.

RICHARD CORNELIUS BARRETT, A. M., LL. B.,
Professor of Civics, 1904.

SPENCER AMBROSE BEACH, B. S. A., M. S.,
Vice Dean of the Division of Agriculture, Professor of Horticulture,
1905.

BENJAMIN H. HIBBARD, B. Ag., Ph. D.,
Professor of Economic Science, 1906, 1902.

WARREN H. MEEKER, M. E.,
Professor of Mechanical Engineering, 1907, 1891.

FRED ALAN FISH, M. E. in E. E.,
Professor of Electrical Engineering, 1907, 1905.

J. BROWNLEE DAVIDSON, B. S., M. E.,
Professor of Agricultural Engineering, 1907, 1905.

MRS. ALICE DYNES FEULING, B. S.,
Professor of Domestic Economy, 1907.

ARTHUR MAC MURRAY, B. A., M. O.,
Professor of Public Speaking, 1908.

M. L. BOWMAN, B. S. A.,
Professor of Farm Crops, 1908, 1905.

MISS MARIA M. ROBERTS, B. L.,
Vice Dean of Junior College, Associate Professor of Mathematics,
1904, 1891.

ARTHUR THOMAS ERWIN, B. S., M. S. A.,
Associate Professor of Horticulture, 1904, 1900.

MISS LOLA ANN PLACEWAY, B. S.,
Associate Professor of Chemistry, 1905, 1896.

MISS VINA ELETHE CLARK,
Librarian, 1897.

MRS. MARIAN H. KILBOURNE, B. L.,
Dean of Women and Instructor in History of Art, 1900.

IOWA STATE COLLEGE

JOHN PIPER WATSON,

Physical Director, 1904.

C. B. STANTON, C. E.,

Associate Professor in Railway Engineering, 1907.

IRA ABRAHAM WILLIAMS, M. S., A. M.,

Associate Professor of Geology and Mining Engineering, 1907, 1898.

J. E. KIRKHAM, B. C. E.,

Associate Professor in Structural Engineering, 1907.

WINFRED F. COOVER, A. M.,

Associate Professor of Chemistry, 1907, 1904.

WAYNE DINSMORE, B. S. A.,

Associate Professor of Animal Husbandry, 1907, 1903.

R. R. DYKSTRA, D. V. M.,

Associate Professor of Anatomy and Obstetrics, 1907, 1905.

LAURENCE C. HODSON, B. C. E., E. M.,

Associate Professor of Mining Engineering, 1907, 1906.

MISS HELEN DONOVAN,

Associate Professor of Domestic Economy, 1907, 1906.

CHARLES A. SCOTT, B. S. A.,

Associate Professor of Forestry, 1908.

HERMAN KNAPP, B. S. A.,

Registrar, 1887, 1883.

MISS CAROLYN GRIMSBY, B. S.,

Reference Librarian, 1908, 1905.

MISS ELIZABETH MACLEAN, M. Di.,

Associate Professor of English, 1908, 1899.

MARK PERKINS CLEGHORN, B. S. in E. E., M. E.,

Associate Professor of Mechanical Engineering, 1908, 1902.

ADOLPH SHANE, B. S. in E. E., E. E.,

Associate Professor of Electrical Engineering, 1908, 1904.

ROBERT EARLE BUCHANAN, M. S.,

Associate Professor of General Bacteriology, 1908, 1904.

CHARLES C. MAJOR, M. E.,

Associate Professor of Mechanical Engineering, 1908.

MARTIN MORTENSEN, B. S. A.,

Associate Professor of Dairying, 1908.

ASSISTANT PROFESSORS.

ALEXANDER STEWART THOMPSON,

Director of Music, Piano, Pipe Organ and Voice, 1907.

CLARA DUTTON THOMPSON,
Vice-Director, Voice, Preparatory Piano and Organ, 1907.

JOSEPH EDWARD GUTHRIE, M. S.,
Assistant Professor of Zoology, 1904, 1902.

THOMAS HARRIS MACDONALD, B. C. E.,
Assistant Professor of Civil Engineering in Charge of Good Road
Investigations, 1905, 1904.

ERNEST ALANSON PATTENGILL, B. S.,
Assistant Professor of Mathematics, 1906, 1900.

MISS JULIA COLPITTS, A. M.,
Assistant Professor of Mathematics, 1906, 1900.

FRANK GILBERT ALLEN, B. S. in M. E.,
Assistant Professor of Mechanical Engineering, 1906, 1904.

HUGH G. VAN PELT, B. S. A.,
Assistant Professor of Animal Husbandry and Superintendent of
Dairy Farm, 1906.

LOUIS BERNARD SCHMIDT, A. M.,
Assistant Professor of History, 1906.

MISS RUTH MORRISON, B. Ph.,
Assistant Professor of Domestic Economy, 1907, 1903.

ROY A. NORMAN, B. M. E.,
Assistant Professor of Mechanical Engineering, 1907.

HOWARD C. FORD, C. E.,
Assistant Professor of Surveying and Irrigation, 1907.

A. H. HOFFMAN, B. S. in E. E.,
Assistant Professor of Physics, 1907, 1905.

W. B. ANDERSON, M. S., Ph. D.,
Assistant Professor of Physics, 1907, 1905.

JOHN BOWER, B. S. A.,
Assistant Professor of Dairying, 1906.

WILLIAM E. MADSON, D. V. M.,
Assistant Professor of Physiology and Sanitary Science, 1907.

*MISS ELIZABETH MOORE, Ph. M.,
Assistant Professor of English, 1908, 1904.

MISS SYBIL LENTNER, B. S.,
Assistant Professor of Public Speaking, 1908, 1904.

MISS WINIFRED TILDEN, B. A.,
Physical Directoress, 1908, 1904.

*Leave of absence for the year 1909-10.

MISS DORA GILBERT TOMPKINS, A. M.,
Assistant Professor of English, 1908, 1905.

MISS JULIA RAMSEY VAULX, A. M.,
Assistant Professor of English, 1908, 1906.

H. C. PIERCE,
Assistant Professor of Animal Husbandry in Charge of Poultry,
1908, 1906.

ROY HIRAM PORTER, B. M. E.,
Assistant Professor of Mechanical Engineering, 1908, 1906.

M. I. EVINGER, B. C. E.,
Assistant Professor of Civil Engineering, 1908, 1906.

HARRY G. BELL, B. S. A.,
Assistant Professor of Farm Crops, 1908, 1907.

B. W. CROSSLEY, B. S. A.,
Assistant Professor of Farm Crops, 1908, 1907.

JOHN E. BRINDLEY, A. M.,
Assistant Professor of Economic Science, 1908, 1907.

MISS BERTHA MOORE,
Assistant Professor of Domestic Economy, 1908.

HAROLD E. BEMIS, D. V. M.,
Assistant Professor in Veterinary Science, 1908.

INSTRUCTORS.

EZRA CORNELIUS POTTER,
Instructor in Pattern Shop, 1898.

MISS ANNIE FLEMING, B. S.,
Instructor in Mathematics, 1900.

MISS GRACE ISABEL NORTON, B. A.,
Instructor in German, 1901.

WARD MURRAY JONES, B. C. E.,
Instructor in Mathematics, 1902.

JESSE GREENLEAF HUMMEL, B. M. E.,
Instructor in Machine Shop, 1903.

MISS ESTELLE DENNIS FOGEL, B. A., B. S.,
Instructor in Botany, 1905, 1904.

EDWARD MERRITT SPANGLER,
Instructor in Pattern Shop, 1905, 1904.

C. E. BARTHOLOMEW, M. S.,
Instructor in Entomology, 1905, 1904.

MISS ETHYL CESSNA, B. S.,
Instructor in History, 1905, 1904.

MISS LOLA STEPHENS, B. S.,
Instructor in Chemistry, 1906, 1905.

CHARLES E. ELLIS, M. S. A.,
Instructor in Mining Engineering, 1906, 1903.

MISS LOUISE PETERS, A. M.,
Instructor in German and Spanish, 1907.

W. R. RAYMOND, A. B.,
Instructor in English, 1907.

MISS INGEBORG LOMMEN, M. L.,
Instructor in German, 1907.

MISS LAURA TAGGART, B. S.,
Instructor in Chemistry, 1907, 1906.

MISS MELISSA FLYNN, B. S.,
Instructor in Chemistry, 1907, 1906.

WILLIAM KUNERTH, A. B.,
Instructor in Physics, 1907.

E. W. HAMILTON, B. S. A.,
Instructor in Agricultural Engineering, 1907.

MISS HELEN F. SMITH, A. B.,
Instructor in Mathematics, 1907.

MISS MABEL CAMPBELL, B. S.,
Instructor in Domestic Economy, 1907, 1906.

ROY WINCHESTER CRUM, B. C. E.,
Instructor in Civil Engineering 1907.

MISS FREDRICA V. SHATTUCK, A. B.,
Instructor in Public Speaking, 1907.

JOSEPH B. VARELA,
Instructor in Mechanical Drawing, 1907.

JOSEPH FREDERICK BARKER, B. S. A.,
Instructor in Soils, 1908.

THEODORE RAY MINERT, B. M. E.,
Instructor in Mechanical Drawing, 1908.

EDWARD N. WENTWORTH, B. S. A.,
Instructor in Animal Husbandry, 1908, 1907.

LAURENZ GREENE, B. S.,
Instructor in Horticulture, 1908, 1907.

IOWA STATE COLLEGE

JOHN T. BATES, B. M. E.,
Instructor in Mechanical Laboratory, 1908, 1907.

MISS MABEL RUNDALL, B. S.,
Instructor in English, 1908, 1907.

J. W. CAMERON,
Instructor in Forge Work, 1908, 1907.

JOHN SAWIN,
Instructor in Foundry, 1908, 1907.

WALTER H. PETERS, B. S. A.,
Instructor in Animal Husbandry, 1908.

MISS AGNES G. MOSHER, B. S.,
Instructor in Mathematics, 1908.

MISS CARRIE WATTERS, A. B.,
Instructor in History, 1908.

WARREN D. FOSTER, Ph. B.,
Instructor in English, 1908.

MRS. MARY P. FAIRFIELD, A. B.,
Instructor in French, 1908.

MRS. D. A. ARVILLE, A. B.,
Instructor in Spanish and French, 1908.

MISS GEORGINA VAN AUKEN,
Instructor in Violin and Stringed Instruments, 1908.

DELBERT WHEELER, B. C. E.,
Instructor in Civil Engineering, 1908.

MISS MARY MAKEPEACE MORRIS, Ph. B.,
Instructor in English, 1908.

MISS MARIE ZIMMERMAN, A. B.,
Instructor in German, 1908.

MISS RUTH BOGARDUS SAFFORD, B. L.,
Instructor in English, 1908.

MYRICK W. PULLEN, B. S. in E. E.,
Instructor in Physics and Electrical Engineering, 1908.

HENRY H. KILDEE, B. S. A.,
Instructor in Animal Husbandry, 1908.

RESIDENT LECTURERS.

GEORGE JUDISCH,
Lecturer on Pharmacy, 1901.

ASSISTANTS.

MISS HARRIETTE KELLOGG, A. M.,
Curator of the Herbarium, 1903.

HENRY NESS, B. S.,
Assistant in Zoology, 1906.

GEORGE MITCHELL,
Farm Foreman,* 1906.

MARGARET FORGEUS, A. B.,
Library Cataloguer, 1906.

ORMA J. B. SMITH, B. S.,
Assistant in Horticulture, 1907.

MISS CAROLINE LAIRD,
Assistant Librarian, Engineering Library, 1907..

MISS LILLIAN M. LISTER, B. S.,
Assistant in Chemistry, 1907.

R. E. CARR,
Assistant in Agricultural Engineering, 1907.

R. W. GETCHELL, B. S. A.,
Assistant in Chemistry, 1907.

CHARLES L. MUNDHENK,
Brass Instruments, 1906.

ROYAL EDGAR JEFFS, B. S. A.,
Assistant in Botany, 1907.

MRS. EMMA CUNNINGHAM,
Matron Margaret Hall, 1907.

A. H. CHADSEY,
Refrigeration Engineer Dairy Department, 1907.

MISS ADA HAYDEN, B. S.,
Assistant in Botany, 1908, 1906.

MISS VERA M. DIXON, B. S.,
Assistant Librarian General Library, 1908.

MISS FLORENCE A. ARMSTRONG,
Assistant in English, 1908.

C. V. GREGORY,
Assistant in Agricultural Journalism, 1908.

THOMAS E. CULP,
Assistant in Dairying, 1908.

D. W. SYLVESTER,
Assistant in Agricultural Engineering, 1908.

F. W. MEYER,
Gardener, 1908.

A. L. BAKKE, B. S.,
Assistant in Botany, 1908.

F. G. CHURCHILL,
Assistant in Chemistry, 1908.

STUDENT ASSISTANTS.

JESSE McKEEN,
Student Laboratory Assistant in Chemistry, 1907.

MISS EMMA WENNHOLZ,
Student Assistant in German, 1908.

MISS EDNA EVERETT,
Student Assistant in English, 1908.

W. A. LIPPINCOTT,
Student Assistant in Poultry Husbandry, 1908.

CHARLES MURRAY,
Student Assistant in Botany, 1908.

C. R. SHUMWAY,
Student Assistant in Zoology, 1908.

RAY WEIRICK,
Student Assistant in Civil Engineering, 1908.

Iowa Highway Commission

Section 1, Chapter 105 of the Laws of 1904 provides that the Iowa State College of Agriculture and Mechanic Arts shall act as a Highway Commission for the State of Iowa.

HIGHWAY COMMISSION STAFF.

ANSON MARSTON, C. E.,
CHARLES FRANKLIN CURTISS, M. S. A.,
Directors.

THOS. H. MACDONALD, B. C. E.,
Highway Engineer.

J. BROWNLEE DAVIDSON, B. S., M. E.,
Engineer of Road Machinery.

Engineering Experiment Station

STATION COUNCIL.

(Appointed by the Board of Trustees.)

ALBERT BOYNTON STORMS, A. M., LL. D.,
President.

ANSON MARSTON, C. E.,
Director.

LOUIS BEVIER SPINNEY, B. M. E., M. S.,
SAMUEL WALKER BEYER, B. S., Ph D,
WARREN H. MEEKER, M. E.,
Professors.

ENGINEERING EXPERIMENT STATION STAFF.

ALBERT BOYNTON STORMS, A. M., D. D., LL. D.,
President, Ex-Officio.

ANSON MARSTON, C. E.,
Director and Civil Engineer.

LOUIS BEVIER SPINNEY, B. M. E., M S,
Electrical Engineer.

SAMUEL WALKER BEYER, B. S., Ph. D.,
Mining Engineer.

WARREN H. MEEKER, M. E.,
Mechanical Engineer.

ALFRED ALLEN BENNETT, M. S.,
Chemist.

C. E. ELLIS, M. S A,
Assistant Chemist.

IRA ABRAHAM WILLIAMS, M. S., A. M.,
Assistant in Engineering Experiment Station.

F. M. OKEY, B. C. E.,
Assistant in Engineering Experiment Station.

Division of Engineering

A. MARSTON, DEAN,
Professor of Civil Engineering.

S. W. BEYER, VICE DEAN.
Professor of Mining Engineering and Geology.

L. B. SPINNEY,
Professor of Electrical Engineering and Physics.

W. H. MEEKER,
Professor of Mechanical Engineering.

The work of the Division of Engineering of the College is apportioned among four departments, viz.:

The Department of Mechanical Engineering.

The Department of Civil Engineering.

The Department of Electrical Engineering.

The Department of Mining Engineering.

Through these departments the College offers systematic four year and five year courses in Mechanical Engineering, Civil Engineering, Electrical Engineering, and Mining Engineering. A four year course in Ceramics, and two year courses in Mining Engineering and Clay Working.

NEW FIVE YEAR ENGINEERING COURSES OF STUDY.

The engineering graduates of the Iowa State College have now come to occupy so many positions of responsibility that there has come from them a strong demand for longer and broader training of part of the engineering students for executive and other positions of large responsibility than can be given by the four year courses of study, such as are standard in the principal engineering schools of the country.

The fact is that in the marvelous advance of civilization in recent years the place of the engineer has become continually more important, and more and more responsibilities of the widest character are placed upon him. To furnish opportunity for the training of such men, new five year engineering courses of study are being established, and all engineering students who can afford the necessary time and expense are urged to take this course in preference to the four year course.

NEW COURSE IN CERAMICS.

At the instance of the Iowa Brick and Tile Manufacturers' Association, and of the Association of Iowa Cement Users, the legislature recently passed a law establishing instruction and experimentation along these lines at the State College.

In obedience to the law a four year course of study in Ceramics has been established, and the proper facilities for instruction and experimentation in the lines of cement and clay products have been provided.

Iowa has great undeveloped resources in these lines which offer an inviting and remunerative field for professional work. We already have calls for graduates to take remunerative positions in the cement industries, and many excellent opportunities offer in the clay industries.

The Engineering Courses.

The several courses are planned with a view to fitting those pursuing them to enter professional engineering work and to advance therein more rapidly than would be possible without the preparation furnished by a college course. Experience shows that the graduates from technical schools generally excel in their chosen lines, and it is worthy of note in this connection that railroads, manufacturers and other corporations, as well as municipalities and government departments, are demanding that those who seek promotion in their technical departments shall have secured a technical training such as can now be obtained in the engineering schools of the country.

It is very manifest, because of the lack of time in the course, the multiplicity of general subjects which must be emphasized and the lack of uniformity of details in the profession due to the local and personal differences which exist in the conduct of engineering work of all kinds that no college course in engineering can give to a student training and experience in all the details of his profession. Moreover it seldom happens that a student in college knows definitely what specific branch of his chosen profession he will follow, and it would be folly for him to spend his time on details which he may never use. A thorough education in the branches of pure and applied science which are related to professional work is essential. Having this, the engineer readily acquires familiarity with the details of his work. Without it no amount of experience with details alone can give an engineer high rank in his profession.

Therefore it is believed that a college course in engineering should be in the first place a training of the mind of the student toward ability to think logically, to observe accurately and by the application of the former acquirement to the latter to reach correct inferences; in the second place such a course should acquaint the student with approved methods of draughting and computing, with the use and limits of the instruments employed in the every day work of his profession, and should give him an opportunity for experimental work bearing upon engineering problems; in the third place such a course should provide

that the student acquire the art of expressing himself, publicly and privately, in good English and should furnish him with some knowledge of the history of his own and preceding times, thus equipping him to be an ornament to his profession, and an enlightened member of society.

In accordance with the views above expressed the engineering courses of this college include a variety of studies. These may be conveniently grouped as culture studies, training or disciplinary studies, professional studies, and practical work.

The culture studies include History, English, Modern Language, Economic Science and Civics. Thorough work in English is especially necessary in the training of the engineer to enable him to express himself with the utmost clearness and conciseness, in his reports and in papers on technical subjects. No one can attain great success as an engineer who fails in these particulars. His success in carrying out projects upon which he is engaged will often depend upon his ability to convince his superiors or public officials of the correctness of his views. The really successful engineer must also come in close contact with other members of his profession, and must exchange information of value with them through the medium of papers on technical subjects. For the attainment of these ends the engineer should give especial attention to the thoroughness of his training in English. Modern language, either French, German, or Spanish not only gives access to the technical foreign literature but also aids the work in English. History, Economic Science, and Civics cultivate interest in mankind at large and are thus broadening to the student.

The training studies include three years of Mathematics and two or three years of Physics, the very backbone of engineering and of the training of the engineer because by their study are secured habits of logical thinking and a knowledge of the fundamental principles of matter—the laws of nature; also one or more years work in Chemistry where the habits of observing and recording facts are thoroughly instilled.

Considerable time in the Junior and Senior Years is given by all engineering students to work having practical bearing on their profession; the object being to correlate, in some measure, theory and practice.

Draughting, shop work and field work are begun upon entrance and continued in proper proportions throughout the several courses. By this means students are frequently able to obtain valuable practical experience during their vacations and are thereby, in turn, benefited by being able to see the usefulness of their college work more clearly than before.

By such vacation work the student is placed in a measure, in the position of the so-called practical engineer, who, if he be honest with himself, wishes for the advantages of a technical education.

In the professional studies the student, through his teachers, text books, and actual practice, gets into touch with the problems which the engineers of the day are trying to solve, and thus learns to appreciate the difficulties which confront them.



CORRIDOR OF ENGINEERING HALL

The professional and practical studies culminate in the graduation thesis in which the student is expected to show energy, determination, resourcefulness and discrimination in the solving of a problem whose solution will add something to the store of engineering knowledge.

A certain amount of undergraduate work and a large amount of graduate work as well as the research work carried on by the individual members of the engineering faculty is devoted to the various industrial interests of the state.

Advanced students are given an opportunity to assist in all research or commercial work which is being conducted by the engineering departments.

Improvement of Engineering Courses.

Thorough revision and improvement of the engineering courses have just been completed. The Senior years of the improved courses will be in force now for the first time. Many improvements and advances are being introduced, which will have the effect of still further advancing the standards of the engineering courses.

FIVE YEAR ENGINEERING COURSES OF STUDY.

The new five year engineering courses of study, already referred to, are published in this catalog for the first time. As compared with the four year courses of study, they contain a much larger amount of general culture subjects, much wider opportunity for choice of electives, and some advanced engineering subjects.

The added culture work includes advanced English, advanced History, and nine to twenty-six hours of elective work. This considerable amount of electives will permit of the selection for each student of general and scientific subjects of such a nature as will be best suited to his particular needs.

In addition, there will be opportunity in the advanced courses for the pursuit of advanced engineering work along lines selected by each student.

These five year courses will be of great benefit to those who can pursue them, combining much of the advantages of a general college training with very thorough technical instruction. It is generally admitted that the ideal training for the engineer would be a complete general college course plus a complete engineering course, but the time and expense of the two courses places such ideal training beyond the reach of practically all. The five year courses will be found to be within the reach of every student, even those who must earn the money to pay their own way through college, and all students are urged to take them.

The five year courses are now arranged so that students already pursuing the four year courses can do the additional year of work, should they so elect, at any time while they are in college.

Demand for I. S. C. Engineering Graduates.

The engineering graduates of the College are scattered in remunerative and most responsible positions over the entire world. The demand for them is, in normal times, constantly greater than the supply. Many of the seniors are engaged long anterior to commencement.

The graduates are scattered from Panama to Alaska, and from New York to the Philippines, with large representation at the principal centers of engineering work. Their representation at such centers is so large that I. S. C. Alumni Associations are numerous throughout the United States and on both coasts of the same, and one exists even in the Philippine Islands.

The George W. Catt Engineering Library.

A signal example of the loyalty to the College of its engineering graduates has been presented in the bequests to the College by Mr. George W. Catt, C. E., '82, who was President of the Atlantic, Gulf and Pacific Dredging Co., and who, on his death, bequeathed to his Alma Mater his extensive engineering and economic libraries and one-half of his large fortune.

The engineering library has been placed in Engineering Hall, in conjunction with the engineering books and periodicals from the general college library, and thus through Mr. Catt's devotion, the engineering students are afforded free access to the best engineering literature. Extensive use of these library privileges is strongly urged on all engineering students. Only by extensive technical reading, especially of the current periodicals, can one become a worthy member of the engineering profession.

Buildings and Equipment.

The buildings occupied exclusively by the Division of Engineering are the Engineering Hall, the Structural and Hydraulic Laboratory, the Power Station, the Foundry, the Pattern Shop, the Locomotive Laboratory, the Forge Shop and the Machine Shop. For full description see index under "Buildings."

COURSES IN ENGINEERING.

The following general courses are given by the Dean, Vice Dean and the Professor of Mechanical Engineering, and are included in the courses of study in each of the engineering departments.

603. Conservation of our Natural Resources. Engineering Courses. The course embraces a study of ways and means not only of preventing unnecessary destruction of our natural resources by unwise use, but also of preventing waste of our natural resources from disuse. Incidentally an inventory of our natural resources is compiled during the progress of the work. Lecture, one hour per week.

702. Specifications and Contracts. Engineering Courses. Principles of engineering contract law, business methods, specifications for engineering construction. One recitation or lecture per week.

801. History of Engineering. Engineering Courses. The early development of engineering, as traced from history and from the remains of ancient works; development of engineering in later periods and its growth into a separate profession; the effect on civilization, general history and economic problems of the several inventions and other improvements which have marked the development of engineering; study of lives of more famous engineers; also the development of the general technical principles of engineering. One hour per week.

DEPARTMENT OF MECHANICAL ENGINEERING.

W. H. MEEKER, PROFESSOR.

C. C. MAJOR, M. P. CLEGHORN, ASSOCIATE PROFESSORS.

F. G. ALLEN, R. A. NORMAN, AND R. H. PORTER, ASSISTANT PROFESSORS.

J. G. HUMMEL, E. C. POTTER, J. W. CAMERON, JOHN SAWIN, J. B. VARELA, T. R.

MINERT, E. M. SPANGLER, JOHN T. BATES, INSTRUCTORS.

R. L. SPENCER, N. LEERBERG, P. SEXSMITH, STUDENT ASSISTANTS.

The headquarters of this department are in Engineering Hall. The principal offices are on the second floor. On this floor are a lecture room and a combination class and drawing room. On the first floor are two rooms devoted to research work in mechanical engineering. On the fourth floor are two drafting rooms accommodating 160 students at one time, fitted with combination drawing tables, instrument cabinets and boards, whereby 480 students can be assigned to mechanical drawing and designing in the department. In conjunction with these rooms is a commodious office for the instructing staff in drawing. In addition the department has a common interest in and use of a photographic room, a blue print room on the fourth floor, the engineering museum, and faculty room on the third floor and the assembly room on the second floor.

The draughting, class and lecture rooms are equipped with ample blackboard space and the offices are fitted with convenient furniture for efficient and accurate administration of the interests of the department.

In addition to the above space in the new Engineering Hall, the department occupies the Engineering Laboratory, the Power House, the Machine Shop, Forge, Foundry, the Pattern Shops, and the Locomotive Laboratory.

In the Engineering Laboratory the hydraulic laboratory is used conjointly with the Department of Civil Engineering, the first, second, and third floors are used for general engineering laboratory work.

Shop Work.

Students in mechanical engineering pursue the full course in shop work, which consists of six hours per week for three and one-half years. Partial courses are given to students in mining and electrical engineering.

The system of instruction in the several shops begins with graded exercises calculated to familiarize the student with tools and with the materials used. The exercises are supplanted as soon as possible by work on machines or parts thereof which are to be put into actual use. By this arrangement greater interest is maintained in the work than would be possible with a strict adherence to the exercise system. The object of the shop work is not to teach trades, but to acquaint the student with the tools, materials and difficulties of shop practice and to establish in the mind principles which will aid him in designing and construction work, in the other studies of his course and in his professional career.

The Machine Shop is a new brick building 150 feet long by 45 feet wide and has a main floor and gallery. At one end of the main floor are located locker room, reading room and office. The tool room is placed near the middle of the shop with room inclosed in the gallery above for small stores.

The Machine Shop is equipped with a twenty-four by twenty-four inch planer, a milling machine, a universal grinding machine, a shaper, a drill press, two emery grinders, a polishing wheel, a power hack saw, a cutting off machine, thirteen engine lathes of capacities from ten to twenty inch swing and three to ten feet between centers, and three speed and drilling lathes together with usual assortment of small tools in the tool room. Power is furnished to this shop by an electric motor.

The Pattern Shop is a brick building, one story high with spacious attic for storage of lumber. The building is one hundred and twenty feet long by forty feet wide. A tool room twelve by twenty feet is screened off in the center. A fire proof room is provided for patterns. The equipment of the pattern shop consists of a universal buzz saw, a mortising machine, planer, buzz planer, band saw, jig saw, grindstone, fifteen turning lathes, benches for thirty students, thirty complete sets of small tools and a number of special tools. Power for this building is furnished by a twenty horse power electric motor.

The foundry equipment is housed in a brick building eighty by forty feet. A steel truss roof structure of substantial construction provides support for an overhead traveling crane, which serves the whole floor for handling heavy ladles and castings. A cupola and blower for melting cast iron, a brass furnace, a core oven, core benches, twenty four sets of moulder's tools, crucibles, and a large assortment of flasks are used for foundry work.

The Forge Shop is housed in a new brick building 38x78 feet, with a store room. Thirty forges, an oil burning annealing and temper-



INTERIOR OF THE FOUNDRY, DEPARTMENT OF MECHANICAL ENGINEERING

ing furnace, donated by the Rockwell Engineering Co., with blower and exhaust fan, drill press, vises, anvils, grindstone and small tools, such as sledges, fullers and swages, constitute the equipment for forge work.

Electric motors supply power for the forge and foundry.

Students are advised to work in outside shops during their vacations. Credit is frequently given on work required in the regular course for such commercial experience.

Drawing.

A preparatory course in freehand and linear perspective is given in the Academic year. The regular drawing room work of the course begins with Mechanical Drawing given in the first semester of the Freshman year. This is followed successively by projective drawing, machine sketching and detailing, kinematic drawing, and designing. The last two years of the course are given up to designing.

The object sought by the drawing room course is to enable the student to make, as quickly as possible, neat and accurate working drawings, to design, in general and in detail, machines or parts thereof, and to apply throughout his knowledge of shop methods and his theoretical information acquired in the laboratory and class room.

The two large drawing rooms on the fourth floor of Engineering Hall and a part of the combination drawing and class room on the second floor of the same building are equipped with fifty combination drawing tables, each accommodating four students at once. The drawing boards are placed in frames adjustable as to height and angle and equipped with parallel rulers. Each unit has twelve drawers which are assigned to students for their drawings, instruments and supplies. Extra drawing boards are supplied so that each place can be used by more than one student at different periods.

An extensive collection of blue prints, photographs, drawings, and trade catalogues, as well as machines and parts thereof, constitute an important part of the working equipment in this branch of the work.

Experimental Engineering.

Experimental work begins with the Junior year and extends to the end of the course. The instruction in this work is thorough, its scope being indicated by the following list of experiments:

Tensile, transverse, torsion and compression tests of materials, properties of lubricants, measurements of power by absorption and transmission dynamometers, steam gauge and indicator spring calibration, flue gas analysis, indicator practice, variation of engine speed, fan-blower tests, calorimetry, including throttling and separating calorimeters, weir and water meter calibration, efficiency tests of steam engines, boilers, gas producer and engine, injectors, and steam heating, electric lighting, refrigerating, power and pumping plants, and thermal analysis of the steam engine, coal calorimetry, besides a number of special experiments in the

line of investigation. Tests on power plants outside of the College are made as frequently as possible. The engineering laboratory work usually culminates in the thesis, which is an exhaustive investigation of a limited subject. From four to five hundred hours of actual time are spent on theses by students in the engineering courses.

The old and new power houses contain the complete electric light and power and pumping plants of the College, all of which are available for experimental work, and constitute a part of the engineering laboratory equipment of the engineering departments of the College. In the power houses are a 51-H. P. Babcock & Wilcox boiler, two 264-H. P. Cahall horizontal water tube boilers, with Roney mechanical stokers with induced draught, two 260-H. P. Sterling boilers with special furnaces and induced draught, a 250-H. P. Corliss engine direct connected to 150 K. W. generator, a 75-H. P. Straight Line engine, a 50-H. P. Ball engine, with five dynamos for alternating and direct current from 15 to 60 kilowatt capacity. In addition to the above, the engineering laboratory equipment of the department consists of a 50-H. P. Fairbanks, Morse & Co.'s suction gas producer and engine equipped with absorption brake, a 25-H. P. Harris Corliss engine with Alden absorption brake, a twelve horse power Otto gasoline engine, an Ericsson Hot Air Engine, a Wheeler condenser, three Worthington and three other water meters, two Venturi meters, a Pelton water motor, a Holly duplex pump, a Morris Machine Works centrifugal pump, injectors, weir and weighing tanks, gas meters, a Crosby steam gauge tester, fan blowers for experimental work, Westinghouse and New York air pumps, a 100,000 pound Riehle testing machine with Gray autographic device, a 50,000 pound Olsen testing machine, an Olsen torsion testing machine, a Doolittle viscosimeter, a Thurston oil tester, a complete De La Vergne refrigerating machine, gas and air analysis apparatus, anemometers, two Thompson, five Crosby, two Star, and one Richards indicators, dynamometers, a Prony brake, Parr coal calorimeter, platform scales and other apparatus essential and accessory to experimental engineering.

The Hydraulic Laboratory is supplied with about 700 feet of 8-inch and 10-inch cast iron pipe from the College elevated tank, of 163,000 gallons capacity. The available head is about 150 feet. In the laboratory a tank is provided 50 feet long by 6 feet wide by 4 feet deep, which is used as a measuring and discharging tank for various pieces of apparatus, and which can also be used for experiments on the resistance of models to propulsion. The water is removed from this tank by two sewers; one 6 inches and the other 15 inches in diameter. These are arranged to be used for experiments on the laws of flow in sewer pipes. The laboratory is also provided with pipes of different sizes so arranged that measurements of the friction losses in these pipes and in their fittings can be made. Additional apparatus in the nature of hydraulic motors, pumps of various types, and apparatus for experiments with orifices is being provided.

Locomotive. The Chicago & Northwestern railway has presented to the department an eight-wheel passenger locomotive and tender complete with attachments. The locomotive will be mounted for experimental work and will be a valuable addition to the laboratory equipment.

The principal dimensions of the locomotive are as follows:

Cylinder, 16x24 inches.

Drivers, diameter, 63 inches.

Driving wheel base, 7 feet, 3 inches.

Total engine wheel base, 21 feet, 3 inches.

Total engine and tender wheel base, 42 feet, 3 inches.

Total weight of engine, 70,000 pounds.

Weight on drivers, 40,000 pounds.

The estate of S. H. Mallory, of Chariton, Iowa, has presented a narrow gauge locomotive, one of the first in service on the mountain roads of Colorado. The valve mechanism is of the Waelschert type and the drivers and leading wheels are on a truck with the cylinders entirely separate from the boilers.

This engine is a very interesting machine and will be the nucleus for a museum of railway mechanical engineering.

Class Room Work.

In the class room the work is carried on by means of recitations and lectures, a text book and recitation being used wherever practicable: it is necessary, however, to present much material not found in text books, and in such cases recourse is had to the lecture system. The projective lantern is freely used in illustrating subjects presented by lecture.

Inspection Trips.

Once each year or oftener visits of inspection are made by the Senior class to power and manufacturing plants in Chicago and other large centers.

Non-Resident Lecturers.

Lectures by men in active engineering work are introduced from time to time and serve to add interest to the College work by bringing students and teachers in contact with the professional engineer and the problems of modern engineering.

Thesis.

So far as possible the graduating thesis is directed along lines which will produce results directly useful to the industrial interests of the State of Iowa, but this object is not furthered to the detriment of the

student to whom the thesis must be first of all an opportunity to think for himself and to apply principles previously inculcated in the regular course of his studies.

Fees.

All students taking the shop work or engineering laboratory are required to pay a fee to defray the cost of materials, power, and breakage. The amount is specified in the description of the courses of study.

Mechanical Engineering at Ames and Throughout the State.

It is the desire of the department to be of all possible service to owners and operators of power stations for heat, light and power, of machine shops and of manufacturing plants in all lines.

To this end correspondence is invited relating to problems on mechanical engineering lines and whenever inquiries by letter or in person indicate a need for investigation demanding the technical skill and equipment of the department the same will be undertaken if possible and the results furnished to all interested.

COURSES IN MECHANICAL ENGINEERING.

Four Year Course in Mechanical Engineering.

This course leads to the degree of Bachelor of Science in Mechanical Engineering. Graduates from this course may receive the full professional degree of Mechanical Engineer by devoting one year to resident study and one year to a responsible engineering position and presentation of a satisfactory thesis, or by five years' service in responsible engineering work and presentation of thesis.

N. B. Engineering Course numbers. The number in hundreds place indicates the semester in which the subject is taught. If the subject is also taught in a previous semester, the true course number is followed by the descriptive course number in parenthesis.

Academic Year.

Any student who at entrance presents satisfactory credit for part of the Academic Course, or who by examination passes part of it satisfactorily, will be classified in such of the remaining work offered in the Academic year as the Dean of the Junior College and the Dean of Engineering shall consider will best prepare him for his college course. After providing in such classification for the remainder of the thirty credits required for entrance to college, the student may complete his schedule by taking up some of the Freshman studies.

A SEMESTER.

		Required semester hours
Mathematics 3	Algebra	5
English 2	Rhetoric and Composition	5
Modern Languages		
Language selected must be carried through the entire year.		
{ Language 1,	French 5 }	5
{ Language 5,	German 5 }	
{ Language 30,	Spanish 5 }	
Civics 1	Government in State and Nation	2
Mechanical Engineering A 19,	Perspective Drawing	1
Total semester hours		18

B SEMESTER.

		Required semester hours
Mathematics 5,	Plane Geometry	3
Mathematics 6,	Solid Geometry	2
Literature 12,	English Classics	4
Modern Languages		
Language selected must be a continuation of the one chosen in first semester.		
{ Language 2,	French 5 }	5
{ Language 6,	German 5 }	
{ Language 31,	Spanish 5 }	
History 16,	The National Period	3
Mechanical Engineering B 29,	Joinery and Wood Turning	1
Total semester hours		18

*Freshman Year.

FIRST SEMESTER.

		Required semester hours
Mathematics 20	Algebra	4
Mathematics 21,	Plane Trigonometry	1
Modern Languages		

Language selected must be carried through the entire year.

*Freshmen who show deficient preparation in English or Mathematics may be assigned by the Dean of the Junior College and the Dean of Engineering, to special classes, with one credit hour more work than indicated above, or in case of clear indication of failure, even with this arrangement, they may be assigned to Academic classes.

Choice {	Language 18 or 57,	French 3	}	3
	Language 20 or 73,	German 3		
	Language 36 or 45,	Spanish 3		
	English 10,	Narration and Description		3
	Chemistry 41,	General Chemistry		3
	Mechanical Engineering 130,	Shop Work		2
	Mechanical Engineering 117,	Technical Lecture		
	Mechanical Engineering 121,	Mechanical Drawing		2
	Military 1,	Military Drill		
Total semester hours				18

SECOND SEMESTER.

		Required semester hours		
Mathematics 22,	Trigonometry	2		
Mathematics 23,	Analytical Geometry	3		
Modern Languages				
Language selected must be a continuation of the one chosen in first semester.				
Choice {	Language 19 or 58,	French 3	}	3
	Language 21 or 74,	German 3		
	Language 37 or 46,	Spanish 3		
English 11,	Exposition	3		
Chemistry 42,	General Chemistry	3		
Mechanical Engineering 232,	Shop Work	2		
Mechanical Engineering 218,	Technical Lecture			
Mechanical Engineering 220,	Descriptive Geometry	2		
Military 2,	Military Drill			
Total semester hours				18

Sophomore Year.

THIRD SEMESTER.

		Required semester hours
Mathematics 24,	Analytical Geometry	2
Mathematics 25,	Calculus	3
English 12,	Argumentation	2
Chemistry 43,	Qualitative Chemistry	3
Physics 303,	Mechanics and Heat	5
Mechanical Engineering 331,	Shop Work	2
Mechanical Engineering 322,	Mechanical Drawing	1
Military 3, or Athletics		
Total semester hours		18

History 17,	The American People	1
To be taken in Sophomore or Junior year.		

FOURTH SEMESTER.

		Required semester hours
Mathematics 26,	Differential and Integral Calculus	4
Chemistry 45,	Analytical Chemistry	2
Physics 404,	Electricity and Magnetism and Light and Sound	5
Mechanical Engineering 401,	Analytical Mechanics	3
Mechanical Engineering 437,	Shop Work	1
Mechanical Engineering 439,	Shop Work	1
Mechanical Engineering 423,	Mechanical Drawing	2
Military 4, or Athletics		—
	Total semester hours	18
History 18,	American Statesmen	1
To be taken in Sophomore or Junior year.		

Junior Year.

FIFTH SEMESTER.

		Required semester hours
Mechanical Engineering 502,	Analytical Mechanics	5
Mechanical Engineering 503,	Materials of Construction	3
Mechanical Engineering 541,	Descriptive Engineering	2
Physics 506,	Electricity and Magnetism	3
Mechanical Engineering 524,	Valve Gear Design	1
Mechanical Engineering 512,	Mechanical Engineering Lab- oratory	1
Mechanical Engineering 533,	Shop Work	2
Physics 523,	Physical Laboratory	1
	Total semester hours	18

SIXTH SEMESTER.

		Required semester hours
Mechanical Engineering 606,	Analytical Mechanics	5
Mechanical Engineering 605,	Machine Design	3
Engineering 603,	Conservation of Natural Re- sources	1
Mechanical Engineering 642,	Descriptive Engineering	1

Electrical Engineering 610,	Direct Current Machinery	3
Mechanical Engineering 625,	Boiler Design	1
Mechanical Engineering 634,	Shop Work	2
Mechanical Engineering 613,	Mechanical Engineering Lab- oratory	1
Physics 615,	Physical Laboratory	1
Total semester hours		18

Optional:

Students obtaining approval of the head of the department may classify, during any semester of the Junior or Senior years, in two hours of optional culture work.

Senior Year.

SEVENTH SEMESTER.

For students graduating in 1910 and later. For course of study of graduates of 1909 see Catalog for 1907-1908.

		Required semester hours
Engineering 702,	Specifications and Contracts	1
Mechanical Engineering 704,	Heat Engines	3
Mechanical Engineering 708,	Railway Mechanical Engineering	3
Mechanical Engineering 707,	Heating and Ventilation	2
Economic Science 9,	Outlines of Economics	3
Mechanical Engineering 726,	Designing	2
Mechanical Engineering 735,	Shop Work	2
Mechanical Engineering 714,	Mechanical Engineering Lab- oratory	1
Electrical Engineering 717,	Electrical Engineering Labora- tory	1
Mechanical Engineering 743,	Mechanical Engineering Sem- inar	
Mechanical Engineering	Thesis begun	
Total semester hours		18

EIGHTH SEMESTER.

		Required semester hours
Engineering 801,	History of Engineering	1
Mechanical Engineering 809,	Constructive Engineering	3
Civil Engineering 855,	Water Supply Engineering	2
Electrical Engineering 815,	Alternating Current Machinery	3
Mechanical Engineering 827,	Designing	3
Mechanical Engineering 811,	Thesis	4

Mechanical Engineering 815,	Mechanical Engineering Lab-	
	oratory	1
Electrical Engineering 818,	Electrical Engineering Laboratory	1
Mechanical Engineering 844,	Mechanical Engineering Seminar	—
Total semester hours		18

Optional:

Students obtaining approval of the head of the department may classify, during any semester of the Junior or Senior years, in two hours of optional culture work.

Five Year Course in Mechanical Engineering.

The following five year course in Mechanical Engineering is offered in response to a demand for an engineering course giving the student a better education in the culture studies and the natural sciences together with an opportunity to specialize along certain engineering lines not possible in the time available in the four year course of study. The course includes all of the work given in the four year course and in addition twenty-four hours of culture and scientific studies, together with ten hours of work given in the engineering departments.

This course leads to the same degree granted to graduates of the four year course, but a graduate may obtain the full professional degree of Mechanical Engineer after one year of responsible professional work and the presentation of a satisfactory thesis.

N. B. ENGINEERING COURSE NUMBERS.—The number in hundreds place indicates the semester in which the subject is taught. If the subject is also taught in a previous semester, the true course number is followed by the descriptive course number in parenthesis.

Freshman Year.

FIRST SEMESTER.

Mathematics 20	Algebra	4
Mathematics 21	Plane Trigonometry	1
Modern Language		
Language selected must be carried through the entire year.		
Choice	{ Language 18 or 57	French 3 }
	{ Language 20 or 73,	German 3 }
	{ Language 36 or 45,	Spanish 3 }
English 10	Narration and Description	3
History 6	French Revolution and XIXth Century	3
Mechanical Engineering 121	Mechanical Drawing	2
Mechanical Engineering 130	Forge Work	2
Mechanical Engineering 117	Technical Lecture	
Military 1	Drill	—
		18

SECOND SEMESTER.

Mathematics 22	Trigonometry	2
Mathematics 23	Analytical Geometry	3
Modern Language		
Language selected must be a continuation of the one chosen in the first semester.		
Choice { Language 19 or 58,	French 3 }	3
Language 21 or 74,	German 3 }	
Language 37 or 46,	Spanish 3 }	
English 11	Exposition	3
History 4	Division and Reunion, 1850 to 1879	3
Mechanical Engineering 220	Descriptive Geometry	2
Mechanical Engineering 232	Foundry	2
Mechanical Engineering 218	Technical Lecture	
Military 2	Drill	
		—
		18

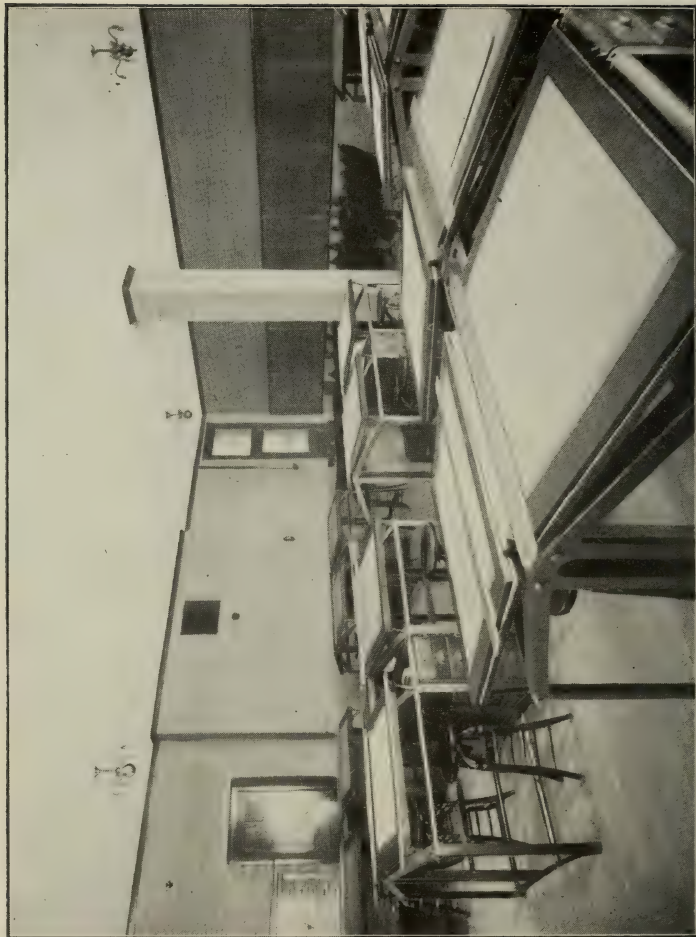
Sophomore Year.

THIRD SEMESTER.

Mathematics 24	Analytical Geometry	2
Mathematics 25	Calculus	3
English 12	Argumentation	2
Chemistry 2	General Chemistry	5
Mechanical Engineering 322	Mechanical Drawing	1
Mechanical Engineering 331	Pattern Work	2
History 17	The American People	1
Elective:	Non-technical work	2
Military 3, or Athletics		—
		18

FOURTH SEMESTER.

Mathematics 26	Differential and Integral Calculus	4
Chemistry 5	Qualitative Analysis	5
Mechanical Engineering 423	Mechanical Drawing	2
Mechanical Engineering 437	Pattern work	1
Mechanical Engineering 439	Pipe Fitting	1
History 18	American Statesmen	1
Elective:	Non-technical work	4
Military 4, or Athletics		—
		18



DRAUGHTING TABLES IN ONE OF THE DRAWING ROOMS, DEPARTMENT
OF MECHANICAL ENGINEERING

Junior Year.

FIFTH SEMESTER.

Physics 503 (303)	Mechanics and Heat	5
Mechanical Engineering 503	Materials of Construction	3
Economic Science 9	Outlines of Economics	3
Civil Engineering 545 (345)	Surveying	2
Mechanical Engineering 533	Machine work	2
Mechanical Engineering 524	Valve Gear Design	1
Mechanical Engineering 541	Descriptive Engineering	2
		—
		18

SIXTH SEMESTER.

Physics 604 (404)	Electricity and Magnetism, Light and Sound	5
Mechanical Engineering 601 (401)	Analytical Mechanics	3
Economic Science 12	Engineering Economics	3
Civil Engineering 646 (446)	Surveying	2
Mechanical Engineering 634	Machine work	2
Mechanical Engineering 642	Descriptive Engineering	1
Elective:	Non-technical work	2
		—
		18

Senior Year.

SEVENTH SEMESTER.

Mechanical Engineering 702 (502)	Analytical Mechanics	5
Physics 706 (506)	Electricity and Magnetism	3
Mechanical Engineering 707	Heating and Ventilating	2
Physics 723 (523)	Physical Laboratory	1
Mechanical Engineering 712 (512)	M. E. Laboratory	1
Mechanical Engineering 735	Machine work	2
Mechanical Engineering 726	Designing	2
Elective:	Non-technical work	2
		—
		18

EIGHTH SEMESTER.

Engineering 803 (603)	Conservation of Natural Resources	1
Mechanical Engineering 806 (606)	Analytical Mechanics	5
Mechanical Engineering 805 (605)	Machine Design	3
Electrical Engineering 810 (610)	Direct Current Machinery	3
Physics 815 (615)	Physical Laboratory	1
Mechanical Engineering 813 (613)	M. E. Laboratory	1
Mechanical Engineering 825 (625)	Boiler Design	1
Elective:	Non-technical work	3
		<hr/>
		18

Post Senior Year.

NINTH SEMESTER.

Engineering 902 (702)	Specifications and Contracts	1
Mechanical Engineering 904 (704)	Heat Engines	3
Mechanical Engineering 908 (708)	Railway Mechanical Engineering	3
Civil Engineering 921 (721)	Sanitary Engineering	3
Mechanical Engineering 914 (714)	M. E. Laboratory	1
Electrical Engineering 920 (720)	E. E. Laboratory	2
Mechanical Engineering	Thesis begun	
Elective:		5
		<hr/>
		18

TENTH SEMESTER.

Engineering 1001 (801)	History of Engineering	1
Mechanical Engineering 1009 (809)	Constructive Engineering	3
Civil Engineering 1055 (855)	Water Supply Engineering	2
Electrical Engineering 1015 (815)	Alternating Current Machinery	3
Electrical Engineering 1018 (818)	E. E. Laboratory	1

Mechanical Engineering 1027		
(827)	Designing	3
Mechanical Engineering 1015		
(815)	M. E. Laboratory	1
Mechanical Engineering 1011		
(811)	Thesis	4
		—
		18

COURSES IN MECHANICAL ENGINEERING.

N. B. Engineering Course Numbers. The number or letter in hundreds place indicates the semester in which the subject is taught.

A19. Perspective Drawing. Mechanical and Electrical Engineering Courses. Use of pencil and pen in sketching and linear perspective. One hour credit. Four hours per week.

B29. Joinery and Wood Turning. Mechanical and Electrical Engineering Courses. Manual training in bench and lathe work in wood. One hour credit. Four hours per week. Fee, \$3.00.

117. Technical Lecture. Mechanical Engineering Course. Study of elementary principles of construction and operation of steam engines, boilers and accessory apparatus. One lecture per week.

121. Mechanical Drawing. Mechanical, Electrical and Mining Engineering and Ceramic Courses and first semester two year courses in Mining Engineering and Clay Working. Use of drawing instruments, practice in lettering, and making working drawings. Two hours credit. Six hours per week.

130. Shop Work. Mechanical, Electrical and Mining Engineering and Ceramic Courses and first semester two year courses in Mining Engineering and Clay Working. Forge work, forging and welding iron and steel, and dressing and tempering tools. Two hours credit. Six hours per week. Fee, \$5.00.

181. Mechanical Drawing. Civil and Agricultural Engineering Courses. The use of drawing instruments, making of working drawings. One hour credit. Three hours per week.

218. Technical Lecture. Mechanical Engineering Course in connection with required shop work. Study of shop methods, tools and appliances. One lecture per week.

220. Descriptive Geometry. Mechanical, Electrical, Mining and Agricultural Engineering and Ceramic Courses. Study of the principles of projection of the point, line, and plane, the basis of all mechanical drawing. The principles are illustrated and fixed in mind by the solution of numerous familiar examples to show the practical application of

the subject. Prerequisites, 121 and 181. Two hours credit. Five hours drawing and one lecture per week.

232. Shop Work. Mechanical and Electrical Engineering Courses, Foundry Work, moulding in green and dry sand and cores, casting in iron, brass, mixtures and alloys. Two hours credit. Six hours per week. Fee, \$5.00.

322. Mechanical Drawing. Mechanical, Electrical, Mining and Agricultural Engineering and Ceramics Courses. Machine Sketching and Detailing. Prerequisites, courses 121 and 220. One hour credit. Three hours per week.

331. Shop Work. Mechanical, Electrical, Mining Engineering and Ceramics Courses, and in the Two Year courses in Mining and Clay Working. Pattern work, principles of Joinery, Wood Turning and Carving as applied to the making of simple patterns and core boxes for iron, brass and aluminum castings. Two hours credit. Six hours per week. Fee, \$5.00.

401. Analytical Mechanics. All Engineering and Agricultural Engineering Courses. Statics, graphics and strength of materials. Text book, *Mechanics of Engineering*, Church. Prerequisites, Mathematics 25. Three recitations per week.

423. Mechanical Drawing. Mechanical and Electrical Engineering and Ceramics Courses, and in Two Year courses in Mining Engineering and Clay Working. Working drawings, tracings, blue prints of complete machines and their details. Prerequisite, Course 322. Two hours credit. Six hours per week.

437. Shop Work. Mechanical and Electrical Engineering Courses. Advanced pattern making, gearing, sweep and moulding machine work. One hour credit. Three hours per week. Fee, \$2.00.

439. Shop Work. Mechanical and Electrical Engineering Courses. Steam fitting and plumbing, cutting and making up threaded, flanged and leaded joints with standard fittings. One hour credit. Three hours per week. Fee, \$3.00.

483. Mechanical Drawing. Mining Engineering and Ceramic Courses. Of same character as course 423. Prerequisite, 322. One hour credit. Three hours per week.

502. Analytical Mechanics. All Engineering and Agricultural Engineering Courses. Flexure and dynamics. Text book same as in course 401, which is a prerequisite. Recitations, five hours per week.

503. Materials of Construction. Mechanical and Electrical Engineering and Ceramic Courses. Manufacture, properties, and uses of iron, steel, wood, cement, etc. Text book, *Materials of Construction*, Johnson. Prerequisite, Chemistry 5 or 45. Recitations, three hours per week.

512. Laboratory. Mechanical, Electrical, Mining and Agricultural Engineering Courses. Properties of materials, calibration of instruments, valve setting, indicator practice and efficiency tests of simple machines. Reference book, *Experimental Engineering*, Carpenter. Prerequisites, 401 and Chemistry 5 and 42. One hour credit. One half day per week. Fee, \$3.00.

524. Valve Gear Design. Mechanical Engineering Course. Kinematics and valve gear design. One hour credit. Three hours draughting and lecture per week.

533. Shop Work. Mechanical and Electrical Engineering Courses. Use of hand and machine tools for working iron, steel and brass, finishing and assembling of machines and parts thereof. Prerequisite, course 130. Two hours credit. Six hours per week. Fee, \$5.00.

541. Descriptive Engineering. Mechanical Engineering Courses. Study and written reports on engineering processes, methods and current engineering construction. References; magazines, journals and proceedings of engineering societies. Two hours per week.

605. Machine Design. Mechanical Engineering Course. Elements of Machine Design. Text book, *Machine Design*, Smith and Marx. Prerequisites, courses 502, 503 and 512. Recitations, three hours per week.

606. Analytical Mechanics. Mechanical and Agricultural Engineering Courses. Work, energy and power, plain and reinforced concrete and hydraulics. Prerequisites, 502 and 503. Recitations, five hours per week.

613. Laboratory. Mechanical, Electrical and Agricultural Engineering and Ceramic Courses. Continuation of course 512. One hour credit. One half day per week. Fee, \$3.00.

625. Designing. Mechanical Engineering Course. Design of steam boilers, also study of form, strength and proportions of the frames and moving parts of cranes and other machines, with detail drawings of the same. Reference books, *Steam Boilers*, Peabody and Miller; *Handbook of Information*, Cambria Steel Co. Prerequisites, 423, 502 and 512. One hour credit. Three hours per week.

634. Shop Work. Mechanical Engineering Course. Course 533 continued. Two hours credit. Six hours per week. Fee, \$5.00.

642. Descriptive Engineering. Mechanical Engineering Course. Course 541 continued. One hour per week.

686. Analytical Mechanics. Civil, Electrical and Mining Engineering and Ceramic Courses. Work, Energy and Power and Hydraulics. Prerequisite, course 502. Recitations, four hours per week.

689. Machine Design. Electrical Engineering Course. Elements

of Machine Design. Text book, Machine Design, Smith and Marx. Prerequisites, 502, 503 and 512. Recitations, two hours per week.

704. Heat Engines. Mechanical Engineering Course. Theory and practical application thereof to the steam engine and other heat engines. Text book, Thermodynamics of Heat Engines, Reeve. Prerequisites, course 512, Physics 303, and Mathematics 26. Recitations or lectures, three hours per week.

707. Heating and Ventilation. Mechanical Engineering Course. Study of modern methods for heating and ventilation. Prerequisite, Physics 303 and simultaneous work in M. E. 726. Recitations or lectures, two hours per week.

708. Railway Mechanical Engineering. Mechanical Engineering Course. Construction and operation of Railway Machinery. Prerequisites, courses 605, 613 and 625. Recitations or lectures, three hours per week.

714. Laboratory. Mechanical and Agricultural Engineering Courses. Efficiency tests of steam, gas, gasoline and hot air engines, boilers, refrigerating machinery and complete plants. Prerequisites, course 613 and simultaneous work in 704. One hour credit. Four hours per week. Fee, \$3.00.

726. Designing. Mechanical Engineering Course. Computation and design of heating and ventilating plants, tools and machinery. Prerequisites, courses 605 and 625 and simultaneous work in 707. Two hours credit. Six hours per week.

735. Shop Work. Mechanical Engineering Course. Advanced machine work, milling, grinding, fitting and assembling. Prerequisite, course 634. Two hours credit. Six hours per week. Fee, \$5.00.

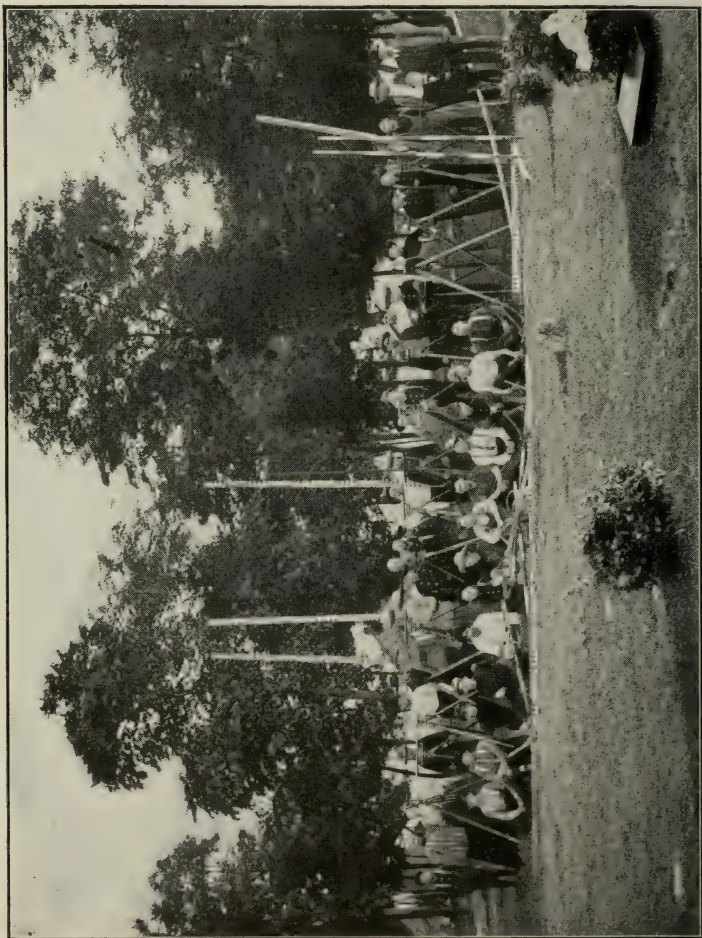
743. Seminar. Mechanical Engineering Course. Written papers and discussions of assigned topics. One meeting per week.

784. Steam Engines and Boilers. Civil, Electrical, and Mining Engineering and Ceramic Courses. Construction, operation and maintenance of standard types of steam engines and boilers. Two lectures or recitations per week.

788. Railway Mechanical Engineering. Civil Engineering Course. Construction and operation of railway machinery. Simultaneous work in 784 required. Recitations and lectures, two hours per week.

809. Constructive Engineering. Mechanical, Electrical, and Mining Engineering and Ceramic Courses. Principles of design and construction of heating, refrigerating, power, lighting and pumping plants in general and detail. Prerequisites, courses 512, 704 and 784. Lectures, three hours per week.

811. Thesis. Mechanical Engineering Course. This course is de-



PART OF THE CIVIL ENGINEERING STUDENTS IN SUMMER CAMP,
DEPARTMENT OF CIVIL ENGINEERING

voted to special work on an approved topic to be selected before the end of the first semester of the Senior year. Taken by those students of the Mechanical Engineering Department who have completed the work of the Junior year. Expenses of the thesis are adjusted by special arrangement in each case. Equivalent to four hours per week.

815. Laboratory. Mechanical Engineering Course. Continuation of course 714. One hour credit. Four hours per week. Fee, \$3.00.

827. Designing. Mechanical Engineering Course. Design of steam engine, selection of engines, boilers and auxiliaries, arrangement of machinery, and design of piping for steam power plant. Prerequisites, completion of work of Junior year and simultaneous work in 809. Three hours credit. Nine hours designing and lecture.

844. Seminar. Mechanical Engineering Course. Written papers and discussions of assigned topics. One meeting per week.

SUBJECT GROUPS IN MECHANICAL ENGINEERING.

The following is a summary of the lines of work given in the Mechanical Engineering Department.

Applied Mechanics and Hydraulics.

401 Analytical Mechanics	605 Machine Design
502 Analytical Mechanics	606 Analytical Mechanics
503 Materials of Construction	613 Laboratory
512 Laboratory	686 Analytical Mechanics

Steam and Power Engineering.

625 Designing	784 Steam Engines and Boilers
704 Heat Engines	788 Railway Mechanical Engineering
707 Heating and Ventilation	
708 Railway Mechanical Engineering	809 Constructive Engineering
	811 Thesis
714 Laboratory	815 Laboratory
726 Designing	827 Designing

Machine Construction.

a29 Joinery and Wood Turning	437 Shop Work
117 Technical Lecture	439 Shop Work
130 Shop Work	533 Shop Work
218 Technical Lecture	634 Shop Work
232 Shop Work	735 Shop Work
331 Shop Work	

Drawing and Design.

a19	Perspective Drawing	483	Mechanical Drawing
121	Mechanical Drawing	524	Valve Gear Design
181	Mechanical Drawing	605	Machine Designing
		625	Designing
322	Mechanical Drawing	726	Designing
423	Mechanical Drawing	827	Designing

Experimental Engineering.

512	Laboratory	714	Laboratory
613	Laboratory	815	Laboratory

Engineering Literature and Reports.

541	Descriptive Engineering	811	Thesis
642	Descriptive Engineering	844	Seminar
743	Seminar		

DEPARTMENT OF CIVIL ENGINEERING.

A. MARSTON, PROFESSOR.

C. B. STANTON AND J. E. KIRKHAM, ASSOCIATE PROFESSORS.

H. C. FORD AND M. I. EVINGER, ASSISTANT PROFESSORS.

T. H. MACDONALD, ASSISTANT PROFESSOR IN CHARGE OF ROAD INVESTIGATIONS.

R. W. CRUM AND D. B. WHEELER, INSTRUCTORS.

RAY WEIRICK, STUDENT ASSISTANT.

The Department of Civil Engineering has its headquarters in Engineering Hall. The offices of the department occupy rooms 311, 315, and 316 in the third story of the building. In addition, the Department has two large class-rooms and a large drawing room in the third story, a drawing room 40 feet by 70 feet, and a large office room in the fourth story, besides a cement laboratory and a masonry laboratory in the first story. The Department also has the use, in common with the other Engineering Departments, of the photographic and blue print rooms in the fourth story, the large Engineering Museum and Library in the third story, and the large Assembly Room in the second story. All of these rooms are finely furnished and equipped throughout.

In connection with the offices provision is made for the systematizing of all the work of the Department, and card indexes for correspondence, equipment, and for general engineering literature are provided.

In addition to the space occupied in Engineering Hall, part of the equipment of the Department is placed in the Structural and Hydraulic Laboratory. Here are located one drawing room, one recitation room,

one instrument room, and two offices, all occupied by the surveying department. There is also located here the Hydraulic Laboratory, and most of the apparatus for testing the materials of construction. In these two lines of work the Departments of Civil Engineering and Mechanical Engineering co-operate.

The Instrumental Surveying Equipment is nearly all kept in room 15 on the third floor of the Structural and Hydraulic Laboratory, where suitable cases and racks are provided for storing it in a systematic way. The instrumental equipment includes fifteen engineer's transits, one plain transit, one astronomical transit, one 7-inch altazimuth, one plane table, one surveyor's compass, one railroad compass, one solar compass, six traverse tables, twelve engineer's levels, and numerous chains, tapes, chaining pins, range-poles, level rods, stadia rods, axes, etc. The Department is also well supplied with minor instruments, such as drawing instruments, clinometers, computing machines, planimeter, hand levels, etc. This equipment is being constantly added to from yearly appropriations.

In giving out the instruments for the field work in the Civil Engineering Course the captain of each field party signs a receipt for all apparatus taken out, and upon return of the same these receipts are canceled and kept on file. Students are required to return all apparatus in as good condition as when taken out.

The Cement Laboratory is located in the first story of Engineering Hall, occupying room 105. Stone topped tables are provided on three sides of this room on which the mixing and breaking of briquettes and similar work is done. On two sides of the room are provided tanks underneath these tables for the storing of briquettes. Investigations are constantly under way with cements and similar substances, so that ample storage room is required. Under the stone topped table on the other side of the room are provided cement bins for storage of cement and standard sand.

A Fairbanks testing machine is used for breaking the briquettes. There is an ample supply of molds for making the briquettes and the usual apparatus is provided for testing soundness, fineness, and rate of setting.

The Roads and Paving and Masonry Laboratory occupies room 106 of the first floor. This room is intended for the testing of materials for roads, and pavements, and for building materials, especially brick and stone. Laboratory tables are provided for the microscopic work and other work in this line. Grinding apparatus is arranged for preparing specimens for crushing and other tests.

This laboratory also contains the abrasion testing machine, the rattler for tests of road materials, the machines for cementation tests of wood materials, a small ball mill, rock crusher and grinder. Apparatus for testing materials of asphalt pavements is also located in this room, inside a glass inclosure. All the apparatus in this laboratory is operated from shafting driven by an electric motor in a separate inclosure.

The Hydraulic Laboratory is located in the basement and first story of the Structural and Hydraulic Laboratory. The basement is lined with enamelled brick. In the floor above is a large railed opening to the basement occupying about one-third of the floor space. The floors and columns are of reinforced concrete. Water is supplied by about 700 feet of 8 inch and 10 inch cast iron pipe from the college elevated tank of 163,000 gallons capacity. The available head is about 150 feet.

To supply water at perfectly uniform pressure and at different moderate heads for experimental work, a steel stand pipe is provided, thirty inches in diameter by 40 feet high.

The waste water from all the apparatus discharges into a tank six feet wide by four feet deep by fifty feet long, located in the floor of the basement.

The water is removed from this tank by two sewers, one 6 inches and the other 15 inches in diameter. These are arranged to be used in experiments on the laws of flow in sewer pipes. The laboratory is also provided with wrought iron pipes of different sizes, so arranged that measurements of friction losses in these pipes and in their fittings can be made. Additional apparatus in the nature of weirs, hydraulic motors and pumps of various types is provided.

Structural Laboratory Facilities for other tests of the materials of construction are provided in connection with the Mechanical Engineering Department in the same building. A 100,000 lbs. tension and compression machine, a 100,000 lbs. transverse machine, a 50,000 lbs. tension and compression machine, a torsion testing machine, a 20,000 lbs. wire testing machine, and other apparatus are provided. Two large laboratory rooms, for computations, instrument rooms, and offices are provided.

Standard Engineering Plans.—The Department has a large collection of blue prints of bridges, roof trusses, buildings and similar structures, which have been kindly donated by the principal corporations engaged in structural engineering throughout the country. In a similar way, the principal railway companies of the country have donated standard plans of railway structures; and many plans and specifications of water works, sewer systems, and other engineering works are also to be found in the Department's collection of standard plans. This collection is constantly being added to. It is arranged systematically in large drawers, in filing cases provided in connection with the office equipment. In the general arrangement, plans relating to the same subject are kept in the same drawer. In addition, a card index is provided whereby any drawing in the collection can readily be found.

The Engineering Museum and Library Room on the third floor of the new Engineering Hall, 60 feet in diameter, is intended for the joint use of all the Departments of Engineering. This room is completely supplied with museum cases, and space is provided in which will be placed large models of engineering structures. The collection of specimens for this Museum is just beginning, but the Civil Engineer-

ing Department has already a set of the full sized sections of wrought iron and steel commonly used in engineering structures and a collection of specimens of Iowa building brick, paving brick, building stone, and other building materials. The Museum collection will be extended as rapidly as possible. The engineering library is located in this room.

Water Works and Sewage Disposal Plant.—The Civil Engineering Department designed and supervised the construction of the college water-works. The College water tower is the largest in the state. It was designed with special reference to its architectural appearance and cuts of it have been published in four of the books treating of the design of such structures. The pumping machinery is so arranged that college students can readily make tests of the efficiency of the apparatus as part of the class work.

The Civil Engineering Department has also designed and supervised the construction of the College sewage disposal system. This is the first purification plant installed in the state and has been very successful.

The water works system and sewage disposal plant are utilized, so far as possible, to furnish practical object lessons to the students in Hydraulic and Sanitary Engineering.

For many years the Civil Engineering Department has been engaged in conducting various investigations helpful to the industrial interests of Iowa, and the results have been made available in numerous publications. This work is now merged in that of the Engineering Experiment Station, described later in this catalogue.

The Alumni of the Department.—The Civil Engineering Department of the Iowa State College is proud of the record made by its Alumni, in all branches of Civil Engineering, as shown by their eminence as engineers. They are to be found located in responsible positions throughout the country and abroad. The Department maintains an Alumni Directory and endeavors to keep in touch, so far as possible, with its graduates. It is often the case that the Department is able to be helpful to the Alumni by recommending them for positions. The Department receives more and more calls for men to fill good positions. Many of these calls come from the older Alumni themselves.

The nature of the positions open to new graduates may be seen from those occupied by one class one year after graduation. Of this class eleven were engaged in railway engineering in the states of Iowa, Illinois, Nebraska, South Dakota, Idaho, New Mexico, Arizona and Washington; two were engaged in reinforced concrete work in Iowa and New York respectively; four were in Panama on the Panama canal work; one was employed on the Government Civil Engineering work in the Philippine Islands; two were employed with consulting engineers in general engineering practice in Texas and New York respectively; four were employed in irrigation engineering work in Wyoming, Montana, and California; four were employed in structural engineering work in

St. Louis, Chicago, and Ambridge, Penn.; one was engaged in water works construction in Iowa, and one was an instructor at the Iowa State College. The salaries of these men ranged up to \$125 per month.

During the year we usually have calls considerably exceeding the total number of the graduating class to fill good positions.

Civil Engineering Course of Study.—This course includes a very careful study of English, Modern Language, either French, German or Spanish, History, Civics, and Economic Science, pure and applied Mathematics, Physics, Geology and Chemistry, together with the professional studies in Civil Engineering.

For detailed information as to the nature of the **professional work given in the course of Civil Engineering**, the reader is referred to the statements regarding each specific subject under the head of "Courses" below. It may be said here in a general way that the instruction in Free-Hand Drawing begins in the Academic Course. Mechanical Drawing, Lettering, the use of Water Colors and Pen Topography are studied in the Sophomore year. In the course of instruction in Drawing it is attempted to give the student such facility in drawing that he can do creditable work in an engineering draughting office. Especial attention is paid to Lettering in the finishing up of all other drawings made in connection with his other professional work. The student is required to letter them plainly and neatly and to make finished plates. Throughout the Sophomore, Junior and Senior years the student has practice in the preparation of maps and of drawings and plans of various engineering structures.

The work in Field Surveying practice begins in the Freshman year and continues for three years, six hours per week, with the exception of the second term of the Freshman year, when only three hours are devoted to Field practice. The student becomes familiar with the various instruments and methods by actually using them. Starting with the simplest problems,—pacing, ranging, and chaining, he gradually works up to the use of the transit, level, and others of greater accuracy and delicacy. He becomes familiar with land surveying, leveling, topographical surveying and railroad surveying by actual work in the field. It is the aim of the course to give the student the facility in the handling of instruments and in the carrying out of operations in field surveying which can only be acquired by considerable practice. It is also attempted to give him as much experience as possible in the handling of small parties of men. Besides the above work students actually camp in the field for two weeks in each of three summer vacations, and so become familiar with topographical work on a more extended scale. In lieu of this summer surveying many students obtain remunerative work with engineers throughout the summer vacation. Such work, when properly certified to by the engineer under whom it is taken, is accepted in lieu of the summer camp surveying. Students are encouraged and urged to secure positions of this kind, as it not only assists them financially, but

also is of great benefit to them in connection with their professional training.

A course of instruction in Land, Topographical, City and Mining Surveying, and Drainage Engineering, runs throughout the Sophomore year and one in Railway Engineering runs throughout the Junior year.

Electric Railways and Power Transmission are also studied in the Junior year.

Instruction in Roads and Pavements is given in the first semester of the Senior year. Sanitary Engineering, Water Works Engineering, Bridge Engineering, and Masonry Structures and Foundations are taught in the Senior year. For the details of each of these courses reference should be made to the information given below under the specific course named. The designing of engineering structures by the student begins in the second semester of the Junior year and continues throughout the Senior year. In this work the student actually designs roof trusses and stone and steel truss bridges, preparing the working drawings. A course of actual practice in testing the various materials of construction in the Engineering Laboratory is given in the Junior and Senior years, and is of great value in familiarizing the student with methods of testing and with the properties of the materials of construction.

General instruction in engineering practice and in the spirit of the profession is given by courses of technical lectures in the Freshman and Sophomore years, and by Seminar work of the Junior and Senior years.

Besides the work as given in the outlined course of study, the student in Civil Engineering gains a large part of his experience and training by inspection of engineering work on the inspection tours arranged for the upper classmen. It is planned at least once a year to have the Senior students go on an inspection trip to some point where various engineering works can be inspected and their instructive features noted. Trips are made to Chicago, St. Paul, St. Louis, and other places.

Valuable instruction is also obtained by listening to lectures given by non-resident lecturers. Practicing engineers are invited to the College to give lectures to the engineering students upon the subjects in which they are experts.

The work of the course finally culminates in the thesis, an original investigation carried on by the student to demonstrate his ability to do such work before he graduates. In the past large amounts of time have been devoted by students as a rule to this work, and it has often been the case that the results have been found worthy of publication. Each student should attempt to make his thesis one of the things of which he can justly be proud throughout the remainder of his professional career.

COURSES IN CIVIL ENGINEERING.

Academic Year.

Any student who at entrance presents satisfactory credit for part of the Academic Course, or who by examination passes part of it satisfactorily, will be classified in such of the remaining work offered in the Academic year as the Dean of the Junior College and the Dean of Engineering shall consider will best prepare him for his college course. After providing in such classification for the remainder of the thirty credits required for entrance to college, the student may complete his schedule by taking up some of the Freshman studies.

A SEMESTER.

		Required semester hours
Mathematics 3	Algebra Review	5
English 2	Rhetoric and Composition	5
Modern Languages		
The Language selected must be carried through the entire year.		
Choice {	Language 1	French 5
	Language 5	German 5
	Language 30	Spanish 5
Civics 1	Government in State and Nation	2
Civil Engineering A47	Field Work	1
		—
	Total semester hours	18

B SEMESTER.

		Required semester hours
Mathematics 5	Plane Geometry	3
Mathematics 6	Solid Geometry	2
Literature 12,	English Classics	4
Modern Languages		
The Language selected must be a continuation of the one chosen in the first semester.		
Choice {	Language 2	French 5
	Language 6	German 5
	Language 31	Spanish 5
History 16	The National Period	3
Civil Engineering B48	Technical Drawing	1
		—
	Total semester hours	18

FOUR YEAR COURSE IN CIVIL ENGINEERING.

The four year Civil Engineering Course, as given below, leads to the degree of Bachelor of Science in Civil Engineering. Graduates of this four year course can secure the advanced degree of Civil Engineering on the completion of five years of successful professional work and the presentation of a satisfactory thesis, or by taking one year of post graduate work at the College, completing one year of satisfactory professional work and presenting a satisfactory thesis.

N. B. ENGINEERING COURSE NUMBERS.—The number in hundreds place indicates the semester in which the subject is taught. If the subject is also taught in a previous semester, the true course number is followed by the descriptive course number in parenthesis.

****Freshman Year.**

FIRST SEMESTER.

Mathematics 20	Algebra	4
Mathematics 21	Plane Trigonometry	1
Modern Languages		
The Language selected must be carried through the entire year.		
Choice {	Language 18 or 57	3
	Language 20 or 73	
	Language 36 or 45	
French 3		
German 3		
Spanish 3		
English 10	Narration and Description	3
Chemistry 41	General Chimestry	3
Civil Engineering 102	Field Work	2
Civil Engineering 101	Civil Engineering Drawing	1
Mechanical Engineering 181	Mechanical Drawing	1
Civil Engineering 141	Technical Lecture	
Military 1	Military Drill	
	Total semester hours	18

SECOND SEMESTER.

		Required semester hours
Mathematics 22	Trigonometry	2
Mathematics 23	Analytical Geometry	3
Modern Languages		

**Freshmen who show deficient preparation in English or Mathematics may be assigned by the Dean of the Junior College and the Dean of Engineering, to special classes, with one credit hour more work than indicated above, or in case of clear indication of failure, even with this arrangement, they may be assigned to Academic classes.

The Language selected must be a continuation of the one chosen in the first semester.

Choice	{ Language 19 or 58	French 3}	3
	{ Language 21 or 74	German 3}	
	{ Language 37 or 46	Spanish 3}	
	English 11	Exposition	3
	Chemistry 49	General Chemistry	4
	Civil Engineering 204	Descriptive Geometry	2
	Civil Engineering 203	Field Work	1
	Civil Engineering 242	Technical Lecture	
	Military 2	Military Drill	
	Civil Engineering 231	Summer Surveying	

All students in Civil Engineering go into camp fifteen days each summer vacation for surveying practice.

Total semester hours	18
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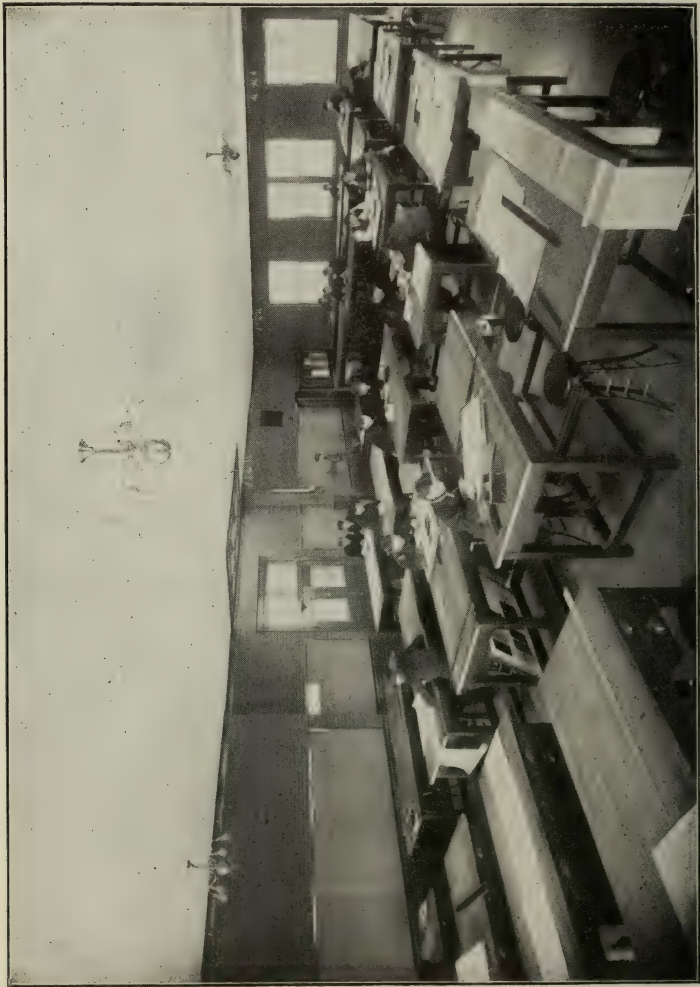
Sophomore Year.

THIRD SEMESTER.

		Required semester hours
Mathematics 24	Analytical Geometry	2
Mathematics 25	Calculus	3
English 12	Argumentation	2
Physics 303	Mechanics and Heat	5
Civil Engineering 308	Surveying	4
Civil Engineering 349	Advanced Descriptive Geometry	1
Civil Engineering 305	Drawing	1
Civil Engineering 343	Technical Lecture	
Military 3, or Athletics		
		<hr/>
Total semester hours		18
History 17,	The American People	1
To be taken in Sophomore or Junior year.		

FOURTH SEMESTER.

		Required semester hours
Mathematics 26	Differential and Integral Calculus	4
Physics 404	Electricity and Magnetism and Light and Sound	5
Mechanical Engineering 401	Analytical Mechanics	3
Civil Engineering 409	Surveying	4
Civil Engineering 450	Advanced Descriptive Geometry	1
Civil Engineering 407	Drawing	1



ONE OF CIVIL ENGINEERING DRAFTING ROOMS, DEPARTMENT OF CIVIL
ENGINEERING

Civil Engineering 444	Technical Lecture
Military 4, or Athletics	
Civil Engineering 432	Summer Surveying
All students in Civil Engineering go into camp fifteen days each summer vacation for surveying practice.	

	Total semester hours	18
History 18	American Statesmen	1
To be taken in Sophomore or Junior year.		

Junior Year.**FIFTH SEMESTER.**

		Required semester hours
Mechanical Engineering 502	Analytical Mechanics	5
Civil Engineering 510	Railway Engineering	5
Electrical Engineering 503	Electric Railways and Power Transmission	2
Physics 523	Physical Laboratory	1
Mathematics 27	Spherical Trigonometry	1½
Civil Engineering 524	Practical Astronomy and Geodesy	2½
Civil Engineering 514	Civil Engineering Laboratory	1
Civil Engineering 527	Civil Engineering Seminar	—
	Total semester hours	18
Optional:		
History 7	America in the Far East	2
English 7	Debating	1
Literature 13	Literature	2
Civics 7	Comparative Government	2

SIXTH SEMESTER.

		Required semester hours
Mechanical Engineering 686	Analytical Mechanics	4
Civil Engineering 611	Railway Engineering	4
Civil Engineering 603	Conservation of Natural Resources	1
Civil Engineering 617	Structural Engineering	4
Civil Engineering 653	Materials of Construction	2
Economic Science 14	Outlines of Economics	2
Civil Engineering 615	Civil Engineering Laboratory	1
Civil Engineering 628	Civil Engineering Seminar	—
Civil Engineering 633	Summer Surveying	—
	Total semester hours	18

All students in Civil Engineering go into camp fifteen days each summer vacation and conduct an organized topographical survey. In place of the two weeks' summer surveying for any year there may be substituted not less than four weeks' actual engineering work done for some competent engineer, a reputable firm, or department engaged in engineering work, if certified by engineer under whom taken, on regular blank furnished by Department of Civil Engineering.

Optional:

History 9	Far Eastern Question	2
English 8	Debating	1
Literature 14	Literature	2
Civics 7	Comparative Government	2
Senior Year.		

SEVENTH SEMESTER.

		Required semester hours
Civil Engineering 718	Structural Engineering	4
Civil Engineering 712	Roads and Pavements	2
Civil Engineering 723	Masonry and Foundations	2
Civil Engineering 721	Sanitary Engineering	3
Mechanical Engineering 784	Steam Engines and Boilers	2
Civil Engineering 716	Civil Engineering Laboratory	1
Civil Engineering 725	Thesis begun	
Civil Engineering 729	Seminar	
Engineering 702	Specifications and Contracts	1
Special Line of Work.		

Each Senior Civil Engineer must elect one of the following special lines at the beginning of his Senior year and this election will govern throughout both Senior semesters.

Choice	Civil Engineering 738	Structural Engineering 3	} 3
	Mechanical Engineering 788, and	Railway Mechanical Engineering 2	
	Civil Engineering 754	Signal Engineering 1	
	Civil Engineering 735	Irrigation Engineering 3	
Total semester hours			18

Optional:

Economic Science 12	Engineering Economics	2
History 7	America in the Far East	2
Literature 13	Literature	2
Civics 7	Comparative Government	2
Botany 33	Technical Bacteriology	3

EIGHTH SEMESTER.

		Required semester hours
Civil Engineering 819	Structural Engineering	3
Civil Engineering 820	Arches and Reinforced Concrete	2
Civil Engineering 822	Water Supply Engineering	3
Geology 803	Engineering Geology	3
Civil Engineering 826	Thesis	3
Civil Engineering 830	Seminar	
Engineering 801	History of Engineering	1
Special Line of Work.		

The special line of work selected at the beginning of the Senior year must be continued through the semester.

Choice	Civil Engineering 839	Structural Engineering 3	3
	Civil Engineering 834	Railway Economics 3	
	Civil Engineering 836	Hydraulic Engineering 3	

Total semester hours 18

Optional:

Economic Science 12	Engineering Economics	2
History 9	The Far Eastern Question	2
Literature 14	Literature	2
Civics 7	Comparative Government	2
Horticulture 17	Wood Technology	3
Chemistry 39	Water and Sewage Analysis	3

FIVE YEAR COURSE IN CIVIL ENGINEERING.

The Five Year Course in Civil Engineering includes all of the work of the four year course plus much general culture and elective culture and science work and some elective advance engineering work. All such engineers as can do so are urged to take this five year course instead of the four year course. It leads to the degree of Bachelor of Science in Civil Engineering as in the case of the four year course, but graduates of the five year course can secure the advance Civil Engineering degree on the completion of only one year of successful professional work and the presentation of a satisfactory thesis.

N. B. ENGINEERING COURSE NUMBERS.—The number in hundreds place indicates the semester in which the subject is taught. If the subject is also taught in a previous semester, the true course number is followed by the descriptive course number in parenthesis.

Freshman Year.

FIRST SEMESTER.

Mathematics 20	Algebra	4
Mathematics 21	Plane Trigonometry	1
Modern Language		

The Language selected must be carried through the entire year.

Choice	Language 18 or 57	French 3	3
	Language 20 or 73	German 3	
	Language 36 or 45	Spanish 3	
	English 10	Narration and Description	3
	History 6	French Revolution and XIX Century	3
	Civil Engineering 101	C. E. Drawing	1
	Mechanical Engineering 181	M. E. Drawing	1
	Civil Engineering 102	Field Work	2
	Civil Engineering 141	Technical Lecture	
	Military 1	Drill	
			—
			18

SECOND SEMESTER.

Mathematics 22	Trigonometry	2
Mathematics 23	Analytical Geometry	3
Modern Language		

The Language selected must be a continuation of the one chosen in the first semester.

Choice	Language 19 or 58	French 3	3
	Language 21 or 74	German 3	
	Language 37 or 46	Spanish 3	
	English 11	Exposition	3
	History 4	Division and Reunion	3
	Civil Engineering 204	Descriptive Geometry	2
	Civil Engineering 203	Field Work	1
	Civil Engineering 206	C. E. Drawing	1
	Civil Engineering 242	Technical Lecture	
	Military 2	Drill	
	Civil Engineering 231	Summer Surveying	

All students in Civil Engineering go into camp fifteen days each summer vacation for surveying practice.

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18

Sophomore Year.

THIRD SEMESTER.

Mathematics 24	Analytical Geometry	2
Mathematics 25	Calculus	3
English 12	Argumentation	2
Chemistry 2	General Chemistry	5
Civil Engineering 308	Surveying	4

Civil Engineering 343	Technical Lecture	
Elective	Non-technical Work	2
Military 3, or Athletics		—
		18

FOURTH SEMESTER.

Mathematics 26	Differential and Integral Calculus	4
English 13	Advanced Composition	2
Chemistry 5	Qualitative Analysis	5
Civil Engineering 409	Surveying	4
Civil Engineering 444	Technical Lecture	
Elective	Non-technical Work	3
Military 4, or Athletics		
Civil Engineering 432	Summer Surveying	

All students in Civil Engineering go into camp fifteen days each summer vacation for surveying practice.

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18

Junior Year.

FIFTH SEMESTER.

Physics 503 (303)	Mechanics and Heat	5
Economic Science 9	Outlines of Economics	3
Mathematics 27	Spherical Trigonometry	1½
Civil Engineering 524	Practical Astronomy and Geodesy	2½
Civil Engineering 505 (305)	C. E. Drawing	1
Civil Engineering 549 (349)	Advanced Descriptive Geometry	1
Elective:	Non-technical Work	4
		—
		18

SIXTH SEMESTER.

Physics 604 (404)	Electricity and Magnetism and Light and Sound	5
Economic Science 15	Engineering Economics	3
Mechanical Engineering 601 (401)	Analytical Mechanics	3
Civil Engineering 650 (450)	Advanced Descriptive Geometry	1
Civil Engineering 607 (407)	C. E. Drawing	1
Elective:	Non-technical Work	5
Civil Engineering 633	Summer Camp	

All students in Civil Engineering go into camp fifteen days each summer vacation for surveying practice.

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18

Senior Year.**SEVENTH SEMESTER.**

Mechanical Engineering 702 (502)	Analytical Mechanics	5
Civil Engineering 710 (510)	Railway Engineering	5
Electrical Engineering 703 (503)	Electric Railways and Power Transmission	2
Physics 723 (523)	Physical Laboratory	1
Civil Engineering 714 (514)	C. E. Laboratory	1
Elective:		4
		—
		18

EIGHTH SEMESTER.

Mechanical Engineering 886 (686)	Analytical Mechanics	4
Civil Engineering 811 (611)	Railway Engineering	4
Civil Engineering 817 (617)	Structural Engineering	4
Civil Engineering 853 (653)	Materials of Construction	2
Civil Engineering 815 (615)	C. E. Laboratory	1
Engineering 803 (603)	Conservation of Natural Resources	1
Elective:		2
		—
		18

Post Senior Year.**NINTH SEMESTER.**

Civil Engineering 918 (718)	Structural Engineering	4
Civil Engineering 912 (712)	Roads and Pavements	2
Civil Engineering 923 (723)	Masonry and Foundations	2
Civil Engineering 921 (721)	Sanitary Engineering	3
Mechanical Engineering 984 (784)	Steam Engines and Boilers	2
Civil Engineering 916 (716)	C. E. Laboratory	1
Civil Engineering 925 (725)	Thesis begun	
Engineering 902 (702)	Specifications and Contracts	1
Elective:	Civil Engineering Work	3
		—
		18

TENTH SEMESTER.

Engineering 1001 (801)	History of Engineering	1
Civil Engineering 1019 (819)	Structural Engineering	3

Civil Engineering 1020 (820)	Arches and Reinforced Concrete	2
Civil Engineering 1022 (822)	Water Supply Engineering	3
Geology 1003 (803)	Engineering Geology	3
Civil Engineering 1026 (826)	Thesis	3
Elective:	Civil Engineering Work	3
		—
		18

A47. Field Work. Civil Engineering Course. Field work, three hours per week. One hour credit.

This course is designed to give the student some familiarity with the elements of surveying; i. e., pacing, ranging, and chaining, before they come to the Freshman year, and to put them in a position to get practical surveying work during their first summer vacation. Text book, Pence & Ketchum's Surveying Manual.

B48. Technical Drawing. Civil Engineering Course. An elementary course in drawing and free hand lettering for Academic students and is prerequisite to the regular Freshman year course in Lettering. Text book, Reinhart's Lettering. One hour credit. Three hours drawing per week.

101. Free Hand Lettering. Civil Engineering Course. Practice work on plain alphabets, both free hand and mechanical, with special attention to the simple free hand lettering. Preparation of plates illustrating the various types of letters and their uses in working drawings, maps, titles, etc. Text book, Reinhart's Lettering. One hour credit. Three hours drawing per week.

102. Field Work. Civil Engineering Course. Two hours credit. Six hours field work per week. Fee, \$2.00.

Courses 102 and 203 are intended to train the student in the solution of the simple surveying problems and in the use of the simple surveying instruments; to give him a thorough preparation for the surveying work of the Sophomore year; and to give him sufficient experience to enable him to obtain a position as chainman or rodman during the summer vacation.

The class is divided into squads of three men each, the idea being to keep the number of men in a squad as low as is consistent with performing the work in order that each man may become familiar with all parts of the work. Pence & Ketchum's "Surveying Manual" is used as a text book and the men are required to perform the problems in strict accordance with the instructions in the "Manual," to check their work within practical limits, and to keep, in a standard field book, complete notes of all problems. Office problems are given from time to time, and as the field work requires it, recitations and lectures are given.

NOTE—The work in courses 102 and 203 is preparatory to the Field Work of the Sophomore and Junior year, which takes the same number of hours per week each year. Thus the student has the training to be obtained by three years' actual experience in the field.

141. Technical Lecture. Civil Engineering Course. Lectures on Civil Engineering Profession, on the reading of current literature, and on the elementary general features of engineering drawing and field work. See Course 444. One lecture per week.

203. Field Work. Civil Engineering Course. For general explanation of the work covered by this course of study, see Course 102. Prerequisite, C. E. 102. One hour credit. Three hours field work per week. Fee, \$2.00.

204. Descriptive Geometry. Civil Engineering Course, two year courses in Mining Engineering and Clay Working. Many original problems are also solved in class and in the draughting room. Descriptive Geometry is the connecting link between pure mathematics and technical drawing, and is taught partly as a theoretical and partly as an applied subject. Many of the problems have direct application to engineering work. Prerequisites, Mechanical Drawing, Mathematics 3 and 5. Two hours credit. Five hours drawing and one hour lecture, per week.

206. Free Hand Lettering. Civil Engineering Course. Exercises in the rendering of free hand sketches. One hour credit. Three hours drawing per week.

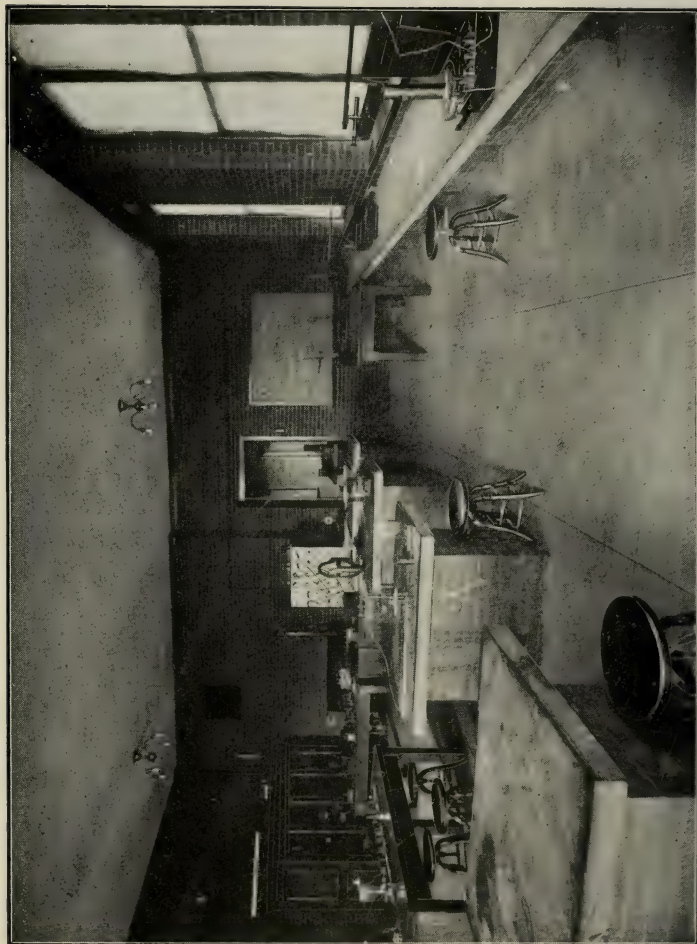
231. Summer Surveying. Civil Engineering Course. See Course 633. Fifteen days work in the field.

242. Technical Lecture. Civil Engineering Course. Lectures on the work of the axemen, chainmen, and rodmen in general surveying and railway surveying and on camp equipment and management. One lecture per week.

305. Drawing, Tinting, Shading and Pen Topography. Civil Engineering Course. Course 101 continued. Practice with water colors, as used in tinting and in shading, the formation and use of topographical and structural symbols, contours and hatchings, and the preparation of topographical maps. One hour credit. Three hours per week.

308. Surveying. Civil Engineering and Horticulture and Forestry Courses, elective Agricultural and Science Courses. Prerequisite, Mathematics 5 and 6, and C. E. 102 and 203. Four hours credit. Recitations, two hours, and field work, six hours, per week. Fee, \$3.00.

Courses 308 and 409 are continuations of Courses 102 and 203. The same method of organizing squads is followed. The work takes up the care and adjustments of surveying instruments, various problems in surveying illustrating the measurements of angles, running traverses by several methods, differential and profile leveling, uses of the plane table, determination of the true meridian by both Polaris and Solar observations, taking topography by various methods and land surveying, with special reference to United States system of land subdivision and to the retracing of lines and location of lost corners. Office work in connection with the field work requires the plotting of maps and profiles, the calculation of areas and balancing of surveys. Calculation of quantities



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and estimates of cost are made in connection with paving and drain surveys. Pence & Ketchum's "Surveying Manual" is used as a field manual.

The recitations cover Breed & Hosmer's "Principles and Practice of Surveying, Vol. I."

The study of Drainage Engineering demands special attention in this state and the course is adapted to such needs. The principles of the subject receive careful attention in the class room and are put into immediate practice in the investigation of various tracts of land in the vicinity of the College where development by drainage is advisable. The thorough drainage of individual farms is considered, and also the engineering and legal methods employed on large districts under county control. The usual reports of the engineer are required from each student, including complete maps and profiles, estimates of cost, and the report of the Commission on the assessment of the various properties. During the past few years it has frequently been found practicable for students to find remunerative work at drainage engineering at various places in the state in addition to their regular class work. Elliott's "Engineering for Land Drainage" is used as a text book for this portion of the work.

343. Technical Lecture. Civil Engineering Course. Lectures on tracing, blue-printing and other methods of reproducing engineering drawings, and on the work of the beginner in a structural drafting office. See course 444. One lecture per week.

345. Surveying. Agricultural and Mining Engineering and Ceramic Courses. Two hours credit. One recitation and three hours field work per week. See course 446. Fee, \$2.00.

349. Advanced Descriptive Geometry. Civil Engineering Course. Consists in the solution of problems relating to warped surfaces and the preparation of isometrical projections of standard structures from working drawings. Text book, MacCord's Descriptive Geometry. Prerequisite, C. E. 204. One hour credit. Three hours drawing and lecture required.

407. Drawing. Plans of Structures. Civil Engineering Course. Course 305 continued. Preparation of working drawings of standard structures, especially railway structures. Prerequisite, course 305. One hour credit. Three hours per week.

409. Surveying. Civil Engineering and Horticulture and Forestry Courses, and elective Agricultural Courses. Prerequisite, course 308. For general explanation of the work covered by this course of study, see course number 308. Recitations, two hours, and field work, six hours, per week. Fee, \$3.00.

432. Summer Surveying. Civil Engineering Course. See course 633. Fifteen days' work in field.

444. Technical Lecture. Civil Engineering Course. Lectures on drainage and topographical surveying, and on work of inspectors. One lecture per week.

Courses 141, 242, 343 and 444 inclusive are required of all Civil Engineers, and are designed to help inculcate the spirit of the engineering

profession, and to permit the presentation of many things essential to the Civil Engineer which cannot readily be given in connected form in connection with the individual subjects of the course.

446. Surveying. Agricultural and Mining Engineering and Ceramic Courses. Prerequisite, Mathematics 5 and 6. Two hours credit. One recitation and three hours field work per week. Fee, \$2.00.

Courses 345 and 446 are an abridgement of courses 308 and 409 and aim to cover only the most important uses of the tape, level and transit. Text book, Pence and Ketchum's "Surveying Manual."

450. Advanced Descriptive Geometry. Civil Engineering Course. The drawing is based on the principles of Descriptive Geometry and includes the solution of a number of problems in Shades, Shadows and Perspective. The work in Perspective Drawing includes the preparation and architectural rendering of a perspective drawing of a building or engineering structure, from the detailed plans. Prerequisite, course 204. One hour credit. Three hours per week.

510. Railway Engineering. Civil Engineering Course. Study of the methods of railway location, preliminary surveys made by both the cross section and the stadia methods; methods of the solution of the simple, compound, and vertical curves; the transition spiral, crossovers, turnouts, and wye tracks; the computation of earthwork and the determination of haul by the mass diagram.

During this semester a preliminary survey is made of a short line from which is prepared a contour map on which a paper location is made and the field notes calculated. This line is then located in the field and cross-sectioned. The grading is calculated, bills of material made up, bridges staked out, and cost of line is estimated. Text book, Allen's "Curves and Earthwork;" Talbot's "Transition Spiral." Prerequisites, Civil Engineering, 102, 203, 308, and 409. Five hours credit. Recitations, three hours, and field work, seven hours, per week. For one of the recitations, three hours of office work is substituted during part of the semester. Fee, \$3.00.

514. Engineering Laboratory. Civil Engineering Course. Work in testing laboratory, making various standard tests of the materials of construction, including cement, building stones, paving brick, wood, cast iron, wrought iron and steel. Prerequisite, M. E. 401. One hour credit per semester. Fee, \$5.00.

524. Practical Astronomy and Geodesy. Civil Engineering Course. Study of ordinary methods of determining latitude, longitude, and time with their application to the Geodetic Surveying. Prerequisite, C. E. 102, 203, 308, 409. Two and one-half hours credit. Recitation, four hours, and laboratory, three hours, per week, during last ten weeks of the semester.

527. Engineering Seminar. Civil Engineering Course. See course 830.

611. Railway Engineering. Civil Engineering Course. Study of the methods of railway construction, and maintenance, standard structures, track accessories, yards and terminals, etc., and the details of the economics of railroad location are dealt with at some length. The field work of this semester consists in the making of station surveys of existing towns, and the mapping of the same. The measuring and detailing of trestles, slip switches, turnouts, etc. Texts, Raymond's "Railroad Engineering;" Tratman's "Railway Track and Track Work."

During the past year complete location surveys for private companies, including complete estimates of cost and all the maps, profiles and other data needed to inaugurate construction were made of two interurban railways in Iowa by parties made up of students selected from the regular class, under direction of the professor in charge. One of these lines was thirty miles in length. It is the general policy to continue such work from time to time as opportunity occurs, selecting the students to do the work from those showing greatest proficiency in this and related studies. Prerequisite, Civil Engineering 510. Four hours credit. Recitations, two hours a week, and field work or draughting, seven hours a week. Fee, \$3.00.

615. Engineering Laboratory. Civil Engineering Course. See 514. Prerequisites, Civil Engineering 514 and Mechanical Engineering 502. One hour credit.

617. Structural Engineering. Civil Engineering Course.

The recitation periods for the first few weeks are devoted to practical lectures upon the manufacturing of the standard steel shapes (from ore to finished product) and upon the fabricating of steel structures in the structural shops, from these shapes, and upon the general construction of steel structures, pointing out the names and the construction of the various types of structures; also the names and style of details of their parts so as to give the student a general knowledge of the details of metal structures before considering the theory involved in their design. At the same time in the drawing room the student is trained in making detail drawings of typical parts of structures, such as I beams with standard connections, posts, stringers, floor-beams, etc. This is intended to train the student in structural drafting and at the same time in the use of the manufacturers' Hand Books. After this lecture course and throughout the remainder of the semester, the recitations are devoted to the theory of stresses in ordinary metal structures while the work in the drawing room consists of actual determining of stresses in the above structures by the analytical and graphical methods, and also by the method of influence lines, using both uniform and concentrated loads, and of the designing and detailing of some of the above structures. Text book, Instructor's Notes. Credit, four hours.

628. Engineering Seminar. Civil Engineering Course. See Course 830.

633. Summer Surveying. Civil Engineering Course. Fifteen days' work in field.

In the work of Courses 231, 432, and 633, several of the professors of Civil Engineering and the students in Civil Engineering go into camp for fifteen days each summer vacation beginning the Saturday before Commencement, and conduct an organized topographical survey of some region in the state. Each year's work continues that of the preceding year, until a large area is mapped. At present Lake Okoboji and surrounding territory are being mapped. Lower classmen will serve in subordinate positions. Upper classmen will take responsible charge of parties, and will do the triangulating and final mapping. Students must pay their own traveling and living expenses. A corps of student officers has direct charge of the work, part of these officers being elected by the students and part appointed by the Department. It is one of the greatest honors in the course of Civil Engineering to be chosen on this corps of officers. The list of student officers for the summer camp of 1908 was as follows:

Chief Engineer—E. F. Kelly.

Assistant Chief Engineer—S. A. Knapp.

Computer—T. J. Schjeldahl.

Chief Draughtsman—F. M. Schader.

Junior Commissary—R. R. Strother.

Sophomore Commissary—G. C. Hoffman.

Freshman Commissary—G. E. Williams.

653. Materials of Construction. Civil and Agricultural Engineering Courses. A study of the materials of engineering construction, including cement, lime, stone, brick, sand, steel, etc. Two hours credit.

656. Structural Engineering. Mining Engineering and Ceramics Courses. The recitation periods for the first few weeks are devoted to practical lectures upon the manufacturing of the standard steel shapes (from ore to finished product) and upon the fabricating of steel structures in the structural shops, from these shapes, and upon the general construction of steel structures, pointing out the names and the construction of the various types of structures; also the names and styles of details of their parts so as to give the student a general knowledge of the details of metal structures before considering the theory involved in their design. At the same time in the drawing room the student is trained in making detailed drawings of typical parts of structures, such as I beams with standard connections, posts, stringers, floor-beams, etc. This is intended to train the student in structural drafting and at the same time in the use of manufacturers' Hand Books. After this lecture course, and throughout the remainder of the semester, the recitations are devoted to the theory of stresses in ordinary metal structures while the work in the Drawing room consists of actual determining of stresses in the above structures by the analytical and graphical methods, and also by the method of influence lines, using both uniform and concentrated loads, and of the

designing and detailing of some of the above structures. Three hours credit.

712. Roads and Pavements. Civil Engineering Course. Study of good roads problem, traffic over country roads, tractive resistance, the best methods of constructing and maintaining earth, gravel, and broken stone roads, and the cost of various kinds of roads. In the study of country roads, especially as relating to Iowa conditions, great assistance is given by the fact that the College is by law the State Highway Commission of Iowa. All its data, plans, maps and publications are available and are largely made use of. In connection with pavements among the topics studied are city streets and grades, classes and methods of construction of pavements, and the cost of various kinds of paving. Text book, Baker's "Roads and Pavements." Recitations, two hours per week.

713. Roads and Pavements. Elective Agricultural Courses. Work similar to Course 712. Text book, Baker's "Roads and Pavements." Recitations, two hours per week.

716. Engineering Laboratory. Civil Engineering Course. Experiments in Hydraulic laboratory, as gauging the flow of water over weirs, through orifices and in sewer pipes, measuring the friction in pipes, and testing the efficiency of pumps and hydraulic motors. One hour credit Fee, \$3.00.

718. Structural Engineering. Civil Engineering Course. After a short review of the structural work taken in the Junior year, the remainder of the semester is devoted to the theory of stresses in what is known as "higher structures," that is, cantilever and suspension bridges, steel arches, lift bridges, draw bridges, etc., and to the designing of same.

Text book, Johnson's "Framed Structures," supplemented by Instructor's Notes. Credit, four hours.

721. Sanitary Engineering. Civil Engineering Course. Study of principles and methods involved in the design, construction and maintenance of sewerage systems, house plumbing and sewage disposal. Text book, Folwell's "Sewerage," and Professor Marston's Notes. Two recitations and one afternoon of designing per week. Three hours credit.

723. Masonry Structures and Foundations. Civil Engineering Course. Study of principles involved in the design and construction of foundations, and in the design, construction, and maintenance of all classes of masonry structures. Text book, Baker's "Masonry Structures." Two recitations per week.

725. Thesis. Civil Engineering Course. Work begun.

729. Engineering Seminar. Civil Engineering Course. See Course 830.

735. Irrigation Engineering. Civil Engineering Course by those students who elect special work in Hydraulic Engineering. Irrigation history and laws, the use and duty of water, irrigation surveys and designs,

the design and construction of ditches and flumes, and dams and reservoirs. Special attention is given to the work of the United States Reclamation Service. Considerable time is devoted to reference work, consisting in studying and preparing reports upon various irrigation systems and structures and other topics of interest. In this work the current technical literature is used to a large extent. Three hours per week are devoted to designing of irrigation structures, dams, headworks, regulators, canals, etc. Estimates of cost of structures designed are made. The textbook is Wilson's "Irrigation Engineering." Prerequisite, M. E. 686. Three hours credit. Recitations, two hours, and designing, three hours, per week.

738. Structural Engineering. Civil Engineering Course by students who elect special work in Structural Engineering. This course is taught in conjunction with Civil Engineering 718 in a special class to students taking structural engineering, making a total of seven credit hours. The work in "higher structures" is very much more thorough and complete than in 718 alone. Three hours credit.

751. Surveying. Electrical Engineering Course. Text book, Pence & Ketchum's Surveying Manual.

Course 751 is designed to give to students in Electrical Engineering a good working knowledge of the engineer's transit and level and their common uses, sufficient to enable them to perform such elementary surveying problems as they are likely to meet in connection with their electrical work. Three hours credit. Recitation, one hour, and field work, six hours, per week.

754. Signal Engineering. Civil Engineering Course by those who elect special work for senior year in Railway Engineering. A study of the methods of signalling by the various railroads, their relative effectiveness and the rules governing the use of the same, train orders, interlocking, etc. Prerequisites, Civil Engineering 510 and 611. One hour credit.

819. Structural Engineering. Civil Engineering Course. This work during the first part of the semester is really a continuation of the structural work taken by same students in the first semester, after which the time will be devoted to a general review of Structural Engineering, in order that the student may have a working knowledge of the subject. Three hours credit.

820. Arches and Reinforced Concrete. Civil Engineering Course. The recitations are devoted to the mechanics of reinforced concrete construction and masonry, analyzing the stresses in reinforced concrete slabs, beams, floors, roofs, retaining walls, and also masonry and reinforced concrete arches. The work in the drawing room consists of: Designing a reinforced concrete beam highway bridge; beams, columns, and floor for an office building; designing of a masonry and a reinforced concrete arch, and also a retaining wall, making complete tracings of most of the designs.

Text-book, "Principles of Reinforced Concrete Construction," by Turneure and Maurer, supplemented by Instructor's Notes. Two hours credit.

822. Water Supply Engineering. Civil Engineering Course. The principles and methods involved in the design, construction and maintenance of water works systems. Text-book, Turneure and Russel's "Water Supply Engineering." Three recitations and one afternoon of designing per week. Three hours credit.

826. Thesis. Civil Engineering Course. Original research on some chosen subjects, as the study and design of some engineering project (including the surveys), the investigation of some engineering question, or an experimental investigation. Three hours credit. Nine hours per week. Students are required to put in as much additional time as may be necessary to thoroughly work up the subject chosen, and to prepare a well-digested and complete write-up of the results.

830. Engineering Seminar. Civil Engineering Course.

The Civil Engineering Seminar, Courses 527, 628, 729 and 830, meets once each week, while College is in session, and has for its members the professors and the instructors in Civil Engineering, and all students in the Junior and Senior classes in the course in Civil Engineering.

The Juniors and Seniors meet separately and each seminar has the organization of an engineer's club, and arranges for programs by students and others similar to those of engineering clubs.

834. Railway Economics. Civil Engineering Course by those who elect special work for Senior year in Railway Engineering. Study of the organization, operation, construction, extension, improvement, existing conditions, operation and regulation of railways with reference to their great duty as public servants as well as their obligations to the holder of their securities.

First—A study of the principles of incorporation, keeping in mind the weighty obligations assumed by any public service corporation who is given and accepts the "Right of eminent domain."

Second—A study of a railway's relation to its stockholders.

Third—The relation of the national government and the methods of government regulation existing and proposed.

Fourth—Their relation to the state and the shipper, including the subjects of railway capital, income, expenditures, the basis of freight rates, freight classification and taxation. Prerequisites Civil Engineering 510, 611, and 754. Three hours credit. Recitations, two hours, and designing three hours, per week.

836. Hydraulic Engineering. Civil Engineering Course by those students who elect special work for the Senior year in Hydraulic Engineering. Hydraulic power development, water wheel, turbine, and impulse wheel installations are studied in their various details, the text-book being Mead's "Water Power Engineering." In addition to the text-book work, considerable time is spent in reference work, studying from

the current technical literature and preparing reports upon various existing power plants and other topics of interest along the same lines. Three hours per week are devoted to designing the various structures connected with hydraulic power plants,—dams, pen-stocks, power canals, pipe lines, etc. Estimates of cost of the structures designed are made. Prerequisite, M. E. 686. Three hours credit. Recitations, two hours, and designing, three hours, per week.

839. Structural Engineering. Civil Engineering Course by students who elect special work in Structural Engineering. This course is taught in conjunction with Civil Engineering 819 in a special class to students taking structural engineering, giving a total of five credit hours and is very much more thorough and complete, especially in "higher structures." Three hours credit.

855. Water Supply Engineering. Mechanical Engineering Course. This course is the same as 822 with the omission of the designing. Two hours credit.

DEPARTMENT OF PHYSICS AND ELECTRICAL ENGINEERING.

LOUIS BEVIER SPINNEY, PROFESSOR.

FRED ALAN FISH, PROFESSOR OF ELECTRICAL ENGINEERING.

ADOLPH SHANE, ASSOCIATE PROFESSOR OF ELECTRICAL ENGINEERING.

W. B. ANDERSON, ASSISTANT PROFESSOR OF PHYSICS.

A. H. HOFFMAN, ASSISTANT PROFESSOR OF PHYSICS.

WM. KUNERTH, INSTRUCTOR IN PHYSICS.

M. W. PULLEN, INSTRUCTOR IN PHYSICS AND ELECTRICAL ENGINEERING.

This department aims to meet the needs of young men who have in mind the practice of electrical engineering in any of its various applications. In outlining the courses the object in view has been to secure for the student a thorough drill in those sciences, the principles of which underlie all electrical engineering practice, to secure for him a training in the application of scientific principles to the solution of practical problems in engineering, and to familiarize him with such methods of the laboratory and testing room as are available for practical and commercial determinations.

The sciences of Mathematics, Physics and Chemistry, are emphasized, as it is believed they are of first importance in such a course. The attention of the student is directed to the value of these subjects and he is urged to give them his most careful consideration.

In recognition of the fact that a knowledge of Mechanical Engineering is essential to many electrical engineering operations, a large part of the student's time is devoted to a training in this direction.

Physics is the basis of the study of electricity and magnetism, the phenomena of which underlie electrical engineering theory and design, and is manifestly of sufficient importance to demand considerable time

and attention in the training of the electrical engineer. In addition to the work in physics prescribed for all engineering students, the electrical engineering student spends six to twelve hours per week in the Junior and Senior years in the physical laboratory and class room.

The Physics lecture room is modern in its equipment, which includes a convenient system of darkening shutters for the windows and a large permanent lantern screen, to facilitate demonstration work. At the lecture room tables are electric, gas and water connection, placing at the disposal of the lecturer water pressure, compressed air and electric currents from storage batteries, and direct or alternating current dynamos.

The department has a good equipment in apparatus for demonstration purposes, which is stored in apparatus rooms adjoining the lecture room.

The general laboratory rooms are large and well lighted and are equipped with heavy oak tables, slate-top piers and wall tables with heavy stone tops for the support of the laboratory apparatus. Convenient electric, gas and water connections are provided. A very serviceable equipment in the apparatus used in general physical laboratory work is furnished. Among other apparatus may be mentioned a laboratory clock, with electric connections, a chronograph, a reversion pendulum, two torsion pendulums for the experimental determination of "moment of inertia" and the "coefficient of simple rigidity," a physical pendulum, apparatus for the determination of the "intensity of gravity" by observations on a body rolling on an inclined plane, analytical balances, Jolly's balance, hydrostatic balance, apparatus for the determination of "Young's Modulus" by stretching and by bending, apparatus for the coefficient of linear expansion, a cathetometer, optical benches, telescopes and microscopes, spectroscopes, a saccharimeter, hydrometers, thermometers, barometers, galvanometers, Wheatstone bridges, "testing apparatus," electrocalorimeters, silver, copper and water coulombmeters, etc.

The photometry rooms are equipped with several photometer benches and are furnished with gas and electric connection. The arrangement of apparatus is made with a view of facilitating the regulation tests of arc and incandescent lamps as well as those of other sources of illumination.

Besides several ordinary photometers, the equipment includes a Matthew's Integrating Photometer, a storage battery of sixty 15 ampere cells, a recording voltmeter, a Weston standard voltmeter and the necessary portable voltmeters and ammeters.

The photographic laboratory is equipped with cameras and other appliances, dark-rooms, skylights, screens, and back grounds for portrait and copying work, and water facilities. The equipment enables the carrying forward of a very practical course in photography in its various applications.

The dynamo laboratory equipment includes 26 dynamos for experimental purposes, among which are three $7\frac{1}{2}$ K. W. 125 volt rotary converters, one 10 H. P. 220 volt 60 cycle 2-phase induction motor with

a wound rotor and external variable resistance with controller, four single-phase alternators of 1, 10, 25, and 35 K. W. capacity, two arc light machines, one 45 K. W. Edison generator, one 25 H. P. four-pole 110 volt motor, one $7\frac{1}{2}$ K. W., 220 volt, revolving field alternator for 1, 2, 3, 6 or 12 phases, one 10-H. P., 220 volt, 2 or 3 phase induction motor with internal resistance type rotor, two $7\frac{1}{2}$ K. W., 125 volt, compound wound d. c. generators, one 10-H. P., 125 volt, inter-pole d. c. motor, two 10 H. P. 125 volt shunt motors, one 5 H. P. 110 volt series d. c. motor, and several 2 and 3 H. P. series and shunt wound direct current machines. The instrument equipment of the laboratory consists of about 60 modern alternating and direct current voltmeters, ammeters and Wattmeters, a number of which are of the switch board type and are mounted at convenient points about the laboratory. The transformer equipment includes a number of modern types of transformers among which are two sets for transforming 3-phase to 2-phase or vice versa.

There are four switch boards in the laboratory, as follows: One containing the terminals of the circuits coming into the laboratory from the power station and from the physical laboratories; one containing instruments, circuit breakers, rheostats, synchronizing apparatus and terminals for the rotary converter set; one containing terminals and apparatus for the induction motor outfit; and one containing no instruments but having upon it jack terminals for 90 circuits which radiate to the other boards, to various convenient points about the laboratory and to a number of lamp banks on the walls; the purpose of this last board being to make it possible to connect together any circuits that may be desired.

There is also a considerable number of other pieces of apparatus, such as instantaneous contact makers, prony brakes, speed counters, inductance coils, tin resistance frames, water rheostats, etc.

In addition to this equipment, the student has access for experimental and test purposes, to the electric machinery of the College power house and lighting plant. Among other machines in this plant are two 15 K. W. Edison dynamos; one 30 K. W. Edison dynamo; one 15 K. W. 500 volt generator; one four-pole 18 K. W. compound-wound generator; one 15 K. W. alternator; one 30 K. W. alternator, and one 60 K. W. alternator. There is also a series of motors for driving the machinery of the Mechanical Engineering Department which range in size from five to twelve horse-power which are available for test purposes.

The repair shop is fitted with an engine lathe, a speed drill, a set of machinist's and carpenter's tools and a stock of shop supplies. This room is used for the repair and manufacture of apparatus.

COURSES IN ELECTRICAL ENGINEERING.

Academic Year.

Any student who at entrance presents satisfactory credit for part of the Academic Course, or who by examination passes part of it satisfac-



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torily, will be classified in such of the remaining work offered in the Academic year as the Dean of the Junior College and the Dean of Engineering shall consider will best prepare him for his college course. After providing in such classification for the remainder of the thirty credits required for entrance to college, the student may complete his schedule by taking up some of the Freshman studies.

A SEMESTER.		Required semester hours
Mathematics 3,	Algebra	5
English 2,	Rhetoric and Composition	5
Modern Languages		
The Language selected must be carried through the entire year.		
Choice {	Language 1, French 5	5
	Language 5, German 5	
	Language 30, Spanish 5	
Civics 1,	Government in State and Nation	2
Mechanical Engineering 19,	Perspective Drawing	1
Total semester hours		18

B SEMESTER.		
Mathematics 5,	Plane Geometry	3
Mathematics 6,	Solid Geometry	2
Literature 12,	English Classics	4
Modern Languages		
The Language selected must be a continuation of the one chosen in the first semester.		
Choice {	Language 2, French 5	5
	Language 6, German 5	
	Language 31, Spanish 5	
History 16,	The National Period	3
Mechanical Engineering 29,	Joinery and Wood Turning	1
Total semester hours		18

FOUR YEAR COURSE IN ELECTRICAL ENGINEERING.

This course leads to the degree of Bachelor of Science in Electrical Engineering. Graduates from this course may receive the full professional degree of Electrical Engineer by devoting one year to resident study and one year to a responsible engineering position and presentation of a satisfactory thesis or by five years service in responsible engineering work and presentation of thesis.

N. B. ENGINEERING COURSE NUMBERS.—The number in hundreds place indicates the semester in which the subject is taught. If the subject is also taught in a previous semester, the true course number is followed by the descriptive course number in parenthesis.

****Freshman Year.**

FIRST SEMESTER.

		Required semester hours
Mathematics 20,	Algebra	4
Mathematics 21,	Plane Trigonometry	1
Modern Languages		
The Language selected must be continued through the entire year.		
Choice {	Language 18 or 57,	3
	Language 20 or 73,	
	Language 36 or 45,	
	French 3}	
	German 3}	
	Spanish 3}	
English 10,	Narration and Description	3
Chemistry 41,	General Chemistry	3
Mechanical Engineering 130,	Shop Work	2
Electrical Engineering 101,	Technical Lecture	
Mechanical Engineering 121,	Mechanical Drawing	2
Military 1,	Military Drill	
		—
	Total semester hours	18

SECOND SEMESTER.

		Required semester hours
Mathematics 22,	Trigonometry	2
Mathematics 23,	Analytical Geometry	3
Modern Languages		
The Language selected must be a continuation of the one chosen in the first semester.		
Choice {	Language 19 or 58,	3
	Language 21 or 74,	
	Language 37 or 46,	
	French 3}	
	German 3}	
	Spanish 3}	
English 11,	Exposition	3
Chemistry 42,	General Chemistry	3
Mechanical Engineering 232,	Shop Work	2
Electrical Engineering 202,	Technical Lecture	
Mechanical Engineering 220,	Descriptive Geometry	2
Military 2,	Military Drill	
		—
	Total semester hours	18

**Freshmen who show deficient preparation in English or Mathematics may be assigned by the Dean of the Junior College and the Dean of Engineering to special classes, with one credit hour more work than indicated above, or in case of clear indication of failure, even with this arrangement, they may be assigned to Academic classes.

Sophomore Year.**THIRD SEMESTER.**

		Required semester hours
Mathematics 24,	Analytical Geometry	2
Mathematics 25,	Calculus	3
English 12,	Argumentation	2
Chemistry 43,	Qualitative Analysis	3
Physics 303,	Mechanics and Heat	5
Mechanical Engineering 331,	Shop Work	2
Mechanical Engineering 322,	Mechanical Drawing	1
Military 3, or Athletics		—
	Total semester hours	18
History 17,	The American People	1

To be taken in Sophomore or Junior year.

FOURTH SEMESTER.

		Required semester hours
Mathematics 26,	Differential and Integral Calculus	4
Chemistry 45,	Analytical Chemistry	2
Physics 404,	Electricity and Magnetism and Light and Sound	5
Mechanical Engineering 437,	Shop Work	1
Mechanical Engineering 439,	Shop Work	1
Mechanical Engineering 401,	Analytical Mechanics	3
Mechanical Engineering 423,	Mechanical Drawing	2
Military 4, or Athletics		—
	Total semester hours	18
History 18,	American Statesmen	1

To be taken in Sophomore or Junior year.

Junior Year.**FIFTH SEMESTER.**

		Required semester hours
Physics 506,	Electricity and Magnetism	3
Physics 514,	Physical Laboratory	2
Mechanical Engineering 502,	Analytical Mechanics	5
Mechanical Engineering 503,	Materials of Construction	3
Mechanical Engineering 533,	Shop Work	2

Mechanical Engineering 512,	Mechanical Engineering Laboratory 1	
Mathematics 10,	Differential Equations	2

—

Total semester hours 18

Optional:

English 7,	Debating	1
History 7,	America in the Far East	2
Civics 7,	Comparative Government	2
Literature 13,	Literature	2

SIXTH SEMESTER.

Required semester
hours

Electrical Engineering 604,	Direct Current Machinery	4
Electrical Engineering 619,	Electrical Engineering Laboratory	1
Physics 607,	Theory of Alternating Currents	3
Physics 617,	Physical Laboratory	2
Mechanical Engineering 686,	Analytical Mechanics	4
Mechanical Engineering 689,	Machine Design	2
Mechanical Engineering 613,	Mechanical Engineering Laboratory	1
Engineering 603,	Conservation of Natural Resources	1

—

Total semester hours 18

Optional:

English 8,	Debating	1
History 9,	The Far Eastern Question	2
Civics 7,	Comparative Government	2
Literature 14,	Literature	2

Senior Year.

SEVENTH SEMESTER.

Required semester
hours

Electrical Engineering 708,	Alternating Current Machinery	4
Electrical Engineering 713,	Principles of Telephony	1
Electrical Engineering 720,	Electrical Engineering Laboratory	2
Electrical Engineering 724,	Electrical Engineering Design	2
Electrical Engineering 729,	Electrical Engineering Seminar	
Mechanical Engineering 784,	Steam Engines and Boilers	2
Engineering 702,	Specifications and Contracts	1
Civil Engineering 751,	Surveying	3
Economic Science 9,	Outlines of Economics	3
Electrical Engineering,	Thesis begun	

—

Total semester hours 18

Optional:

History 7,	America in the Far East	2
Civics 7,	Comparative Government	2
Literature 13,	Literature	2
English 7,	Debating	1

EIGHTH SEMESTER.

		Required semester hours
Electrical Engineering 816,	Electric Power Plants and Transmission	3
Electrical Engineering 809,	Electric Railways	3
Electrical Engineering 821,	Electrical Engineering Laboratory	2
Electrical Engineering 825,	Electrical Engineering Design	2
Electrical Engineering 830,	Electrical Engineering Seminar	
Electrical Engineering 840,	Electrical Engineering Thesis	4
Mechanical Engineering 809,	Constructive Engineering	3
Engineering 801,	History of Engineering	1
		—
	Total semester hours	18
Optional:		
Economic Science 12,	Engineering Economics	2
History 9,	The Far Eastern Question	2
Civics 7,	Comparative Government	2
English 8,	Debating	1

FIVE YEAR COURSE IN ELECTRICAL ENGINEERING.

The following five year course in Electrical Engineering is offered in response to a demand for an engineering course giving the student a better education in the culture studies and the natural sciences, together with an opportunity to specialize along certain engineering lines not possible in the time available in the four year course of study. The course includes all of the work given in the four year course and in addition thirty hours of culture and scientific studies, together with four hours of work given in the engineering departments.

This course leads to the same degree granted to graduates of the four year course but a graduate may obtain the full professional degree of Electrical Engineer after one year of responsible professional work and the presentation of a satisfactory thesis.

N. B. ENGINEERING COURSE NUMBERS.—The number in hundreds place indicates the semester in which the subject is taught. If the subject is also taught in a previous semester, the true course number is followed by the descriptive course number in parenthesis.

Freshman Year.**FIRST SEMESTER.**

Mathematics 20,	Algebra	4
Mathematics 21,	Plane Trigonometry	1
Modern Language		

The Language selected must be continued through the year.

Choice {	Language 18 or 57,	French 3	3
	Language 20 or 73.	German 3	
	Language 36 or 45,	Spanish 3	
English 10,	Narration and Description	3	
History 6,	French Revolution and XIXth Century	3	
Mechanical Engineering 121,	Mechanical Drawing	2	
Mechanical Engineering 130,	Forge Work	2	
Electrical Engineering 101,	Technical Lecture		
Military 1,	Drill		
Total semester hours			18

SECOND SEMESTER.

Mathematics 22,	Trigonometry	2
Mathematics 23,	Analytical Geometry	3
Modern Language		

The Language selected must be a continuation of the one chosen in the first semester.

Choice {	Language 19 or 58,	French 3	3
	Language 21 or 74,	German 3	
	Language 37 or 46,	Spanish 3	
English 11,	Exposition	3	
History 4,	Division and Reunion, 1850-1876	3	
Mechanical Engineering 220,	Descriptive Geometry	2	
Mechanical Engineering 232,	Foundry	2	
Electrical Engineering 202,	Technical Lecture		
Military 2,	Drill		
Total semester hours			18

Sophomore Year.**THIRD SEMESTER.**

Mathematics 24,	Analytical Geometry	2
Mathematics 25,	Calculus	3
English 12	Argumentation	2

Chemistry 2,	General Chemistry	5
Mechanical Engineering 322,	Mechanical Drawing	1
Mechanical Engineering 331,	Pattern Work	2
History 17,	The American People	1
Elective:	Non-technical Work	2
Military 3, or Athletics,		—
	Total semester hours	18

FOURTH SEMESTER.

Mathematics 26,	Differential and Integral Calculus	4
English 13,	Advanced Composition	2
Chemistry 5,	Qualitative Analysis	5
Mechanical Engineering 423,	Mechanical Drawing	2
Mechanical Engineering 437,	Pattern Work	1
Mechanical Engineering 439,	Pipe Fitting	1
Civics 6,	Actual Government	3
Military 4, or Athletics		—
	Total semester hours	18

Junior Year.

FIFTH SEMESTER.

Mathematics 10	Differential Equations	2
Physics 503 (303),	Mechanics and Heat	5
Economic Science 9,	Outlines of Economics	3
Civil Engineering 545 (345),	Surveying	2
Mechanical Engineering 533,	Machine Work	2
Literature 13,	Literature	2
Elective:	Non-technical Work	2
	Total semester hours	18

SIXTH SEMESTER.

Physics 604 (404),	Electricity and Magnetism, Light and Sound	5
Economic Science 12,	Engineering Economics	3
Literature 14,	Literature	2
Mechanical Engineering 601 (401),	Analytical Mechanics	3
Mechanical Engineering 634	Machine Work	2
Civil Engineering 646 (446),	Surveying	2
History 18,	American Statesmen	1
	Total semester hours	18

Senior Year.

SEVENTH SEMESTER.

Physics 706 (506),	Electricity and Magnetism	3
Physics 714 (514),	Physical Laboratory	2
Mechanical Engineering 702 (502),	Analytical Mechanics	5
Mechanical Engineering 703 (503),	Materials of Construction	3
Mechanical Engineering 712 (512),	Mechanical Engineering Labora- tory	1
Elective:	Non-technical Work	4
Total semester hours		18

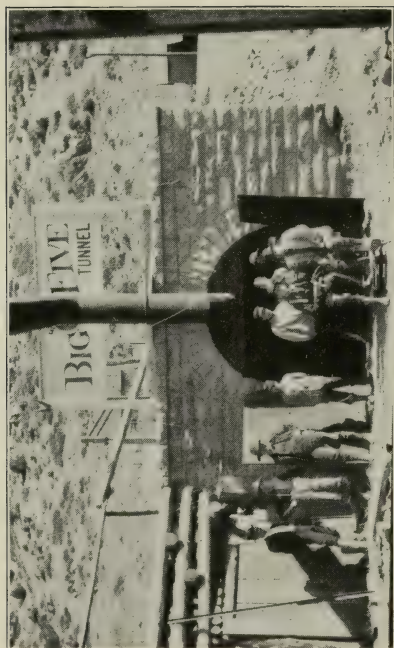
EIGHTH SEMESTER.

Physics 807 (607),	Theory of Alternating Currents	3
Physics 817 (617),	Physical Laboratory	2
Electrical Engineering 804 (604),	Direct Current Machinery	4
Electrical Engineering 819 (619),	Electrical Engineering Laboratory	1
Mechanical Engineering 805 (605),	Machine Design	2
Mechanical Engineering 806 (606),	Analytical Mechanics	4
Mechanical Engineering 813 (613),	Mechanical Engineering Labora- tory	1
Engineering 803 (603),	Conservation of Natural Resources	1
Total semester hours		18

Post Senior Year.

NINTH SEMESTER.

Electrical Engineering 908 (708),	Alternating Current Machinery	4
Electrical Engineering 920 (720),	Electrical Engineering Laboratory	2
Electrical Engineering 924 (724),	Electrical Engineering Design	2
Electrical Engineering 929 (729),	Electrical Engineering Seminar	
Mechanical Engineering 984 (784),	Steam Engines and Boilers	2



SUMMER PRACTICE WORK IN MINING ENGINEERING,
METAL MINES, IDAHO SPRINGS, COLORADO

Engineering 902 (702),	Specifications and Contracts	1
Geology 901 (501),	General Geology	4
Elective:		3
Electrical Engineering,	Thesis begun	—
	Total semester hours	18

TENTH SEMESTER.

Electrical Engineering 1009 (809),	Electric Railways	3
Electrical Engineering 1016 (816),	Power Plants and Transmission	3
Electrical Engineering 1021 (821),	Electrical Engineering Laboratory	2
Electrical Engineering 1025 (825),	Electrical Engineering Design	2
Electrical Engineering 1030 (830),	Electrical Engineering Seminar	
Electrical Engineering 1040 (840),	Electrical Engineering Thesis	4
Engineering 1001 (801),	History of Engineering	1
Elective:		3
	Total semester hours	18

COURSES IN PHYSICS.

205. Mechanics, Heat and Light. Courses in the Division of Agriculture, except Agricultural Engineering. A study of the fundamental principles of Physics and their applications. Lecture and recitations. Prerequisite, Mathematics 17. Three hours credit. Fee for mimeograph notes, \$1.50.

301. Mechanics and Heat. Domestic Economy Course and the choice between Physics 301 and 303 in the General Science Course. Includes study of mass, force, energy and power, also graphic methods of solving problems in force actions, velocities, etc., radiation in general and wave motion; also mechanics and heat. Prerequisites, Mathematics 4, 5 and 6. Three hours credit. Recitations and lectures. Fee for mimeograph notes, \$1.50.

303. Mechanics and Heat. Engineering Courses and Agricultural Engineering Course and a choice between this and 301 in the General Science Course. Study of the fundamental principles of the work, also study of vector quantities and their treatment. A view of the subject from the mathematical standpoint is emphasized and the student is urged to familiarize himself with the theoretical side of the question, as it is believed that such a foundation is essential to the work which

follows. Prerequisites, Mathematics 4, 5, and 6. Five hours credit. Lectures three hours, recitation one hour, and laboratory one period per week. Fee, \$3.50 (Laboratory, \$2.00; notes, \$1.50).

402. Electricity and Magnetism and Light and Sound. Domestic Economy and the choice between this study and 404 in the General Science Course. Includes study of electricity, magnetism, light and sound. This course together with course 301 is to meet the needs of the students in Domestic Economy. The breadth of the course, together with the emphasis which is placed upon the essentials, adapt it to the needs of teachers and others who desire a general training in physics. Prerequisite, Physics 301. Three hours credit. Lectures and recitations. Fee for mimeograph notes, \$1.50.

404. Electricity and Magnetism and Light and Sound. Engineering Courses and Agricultural Engineering, and a choice between this and 402 in the General Science Course, and elective Agricultural Courses. Prerequisite, Physics 303. Five hours credit. Lectures three hours, recitation one hour, and laboratory one period per week. Fee, \$3.50. (Laboratory, \$2.00; notes, \$1.50.)

506. Electricity and Magnetism. Mechanical and Electrical Engineering Courses. Elementary theory of electricity and magnetism; discussion of measuring instruments and laboratory methods of measuring various electrical quantities. Lectures, recitations, and problems. Text-book, Nichols and Franklin, "Elements of Physics," Vol. II. Prerequisites, Physics 303 and 404, and Mathematics 26. Three hours credit.

509. Theory and Practice of Photography. Elective in all Courses (only upon recommendation by head of department in which student is taking his major work). Lecture, one hour, and laboratory, one period per week. Fee, \$5.00.

514. Physical Laboratory. Electrical Engineering Course, and elective Science Courses. Measurement of length, mass and time, determination of physical constants, use of barometer, thermometry, calorimetry, etc. Prerequisites, Physics 303 and 404 and Mathematics 26. Laboratory, two periods per week. Fee, \$5.00.

516. Physical Laboratory, Elementary Physical Measurements. Elective Science Courses. Work as offered in Course 615. Laboratory, two periods a week. Fee, \$5.00.

523. Physical Laboratory. Mechanical and Civil Engineering and Ceramics Courses, and elective Science Courses. Laboratory, one period per week. Fee, \$3.00.

607. Theory of Alternating Currents. Electrical Engineering Course. Prerequisites, Physics 506 and Mathematics 10. Lectures and recitations, three hours per week.

615. Physical Laboratory, Elementary Physical Measurements. Mechanical Engineering Course, elective Science Courses. Measurement of electro-motive force and internal resistance of, primary and secondary batteries, use of Wheatstone's bridge, measurement of current,

determination of galvanometer constants, high resistance measurements, insulation tests. Laboratory, one period per week. Fee, \$3.00.

617. Physical Laboratory, Elementary Physical Measurements. Electrical Engineering Courses, elective Science Courses. Work as offered in Course 615. Laboratory, two periods per week. Fee, \$5.00.

COURSES IN ELECTRICAL ENGINEERING.

101. Technical Lecture. Electrical Engineering Course in connection with required Shop Work. Elementary principles of Electrical Engineering. One lecture per week.

202. Technical Lecture. Electrical Engineering Course in connection with required Shop Work. Continuation of Electrical Engineering 101. One lecture per week.

503. Electric Power Transmission and Railways. Civil Engineering Course. An elementary study of the principles of electrical machinery and the transmission and distribution of power for industrial purposes, including power plants, transmission lines and electric railways. Prerequisites, Physics 303 and 404, and Mathematics 26. Two hours per week.

604. Direct Current Machinery. Electrical Engineering Course. General theory of the direct current dynamo, the establishment of electromotive forces by induction, the magnetic circuit, armature windings, characteristic curves, and the adaption of the different types of direct-current machinery to various commercial purposes is included. Text, Franklin and Esty's "Elements of Electrical Engineering." Prerequisite, Physics 506. Lectures and recitations, four hours per week.

610. Direct Current Machinery. Mechanical Engineering Course. Same topics as in Electrical Engineering 604, but with less detail. Prerequisite, Physics 506. Text-book, Franklin and Esty's "Elements of Electrical Engineering." Recitations, three hours per week.

619. Electrical Engineering Laboratory. Electrical Engineering Course. Elementary experiments on direct current circuits, machines and instruments. Must be preceded by Physics 517 and accompanied by Electrical Engineering 604 or 610. Laboratory, one period per week. Fee, \$3.00.

708. Alternating Current Machinery. Electrical Engineering Course. Study of alternating current generators, motors, transformers, etc. Prerequisites, Physics 607 and Electrical Engineering 604. Lectures and recitations. Four hours per week.

712. Electric Power Transmission and Mining. Mining Engineering Course. A study of the application of electrical machinery to industrial purposes, including electrical transmission and mining. Prerequisites, Physics 303 and 404, and Mathematics 26. Lectures and recitations, three hours per week.

713. Telephony. Electrical Engineering Course. General study of telephony, the telephone, telephone lines, and commercial apparatus. Prerequisite, Physics 607. Lecture, one hour per week.

717. Electrical Engineering Laboratory. Mechanical Engineering Course. Study of direct current machinery. Prerequisite, Electrical Engineering 604. Laboratory, one period per week. Fee, \$3.00.

720. Electrical Engineering Laboratory. Electrical Engineering Course. Advanced study of direct current machinery operation and beginning study of alternating current circuits and instruments. Must be accompanied or preceded by Electrical Engineering 708. Prerequisites, Electrical Engineering 619 and 604, or 610 and Physics 607. Laboratory, two periods per week. Fee, \$5.00.

724. Electrical Engineering Design. Electrical Engineering Course. The design of direct current generators. Prerequisite, Electrical Engineering 604. Two afternoons per week.

729. Electrical Engineering Seminar. Electrical Engineering Course. Consists of preparation, presentation and discussion of papers upon special assigned topics in Electrical Engineering. Papers must be carefully written and submitted to professor in charge.

809. Electric Railways. Electrical Engineering Course. A study of electric railway systems and apparatus, including the design of feeders and trolleys and the determination of the proper equipment for a given service. Prerequisite, Electrical Engineering 708. Lectures and recitations, three hours per week.

815. Alternating Current Machinery. Mechanical Engineering Course. Same topics as Electrical Engineering 708, but with less detail. Prerequisite, Electrical Engineering 610. Lectures and recitations three hours per week.

816. Electric Power Plants and Transmission. Electrical Engineering Course. A study of the principles underlying the lay-out of power-house and switchboard circuits and of distributing systems, including the determination of the most economical size of conductors for such systems, taking into account current prices of materials, rates of interest and depreciation, and cost of power, also numerous original and practical problems illustrating the principles. Prerequisite, Electrical Engineering 708. Lectures and recitations, three hours per week.

818. Electrical Engineering Laboratory. Mechanical Engineering Course. Study of alternating current circuits and machinery. Prerequisite, Electrical Engineering 717. Must be accompanied by Electrical Engineering 815. Laboratory, one period per week. Fee, \$3.00.

821. Electrical Engineering Laboratory. Electrical Engineering Course. Continuation of Course 720. Study of alternating current generators and motors, and commercial transformers. Laboratory, two periods per week. Fee, \$5.00.

825. Electrical Engineering Design. Electrical Engineering

Course. The design of alternating current generators and transformers. Prerequisite, Electrical Engineering 724. Two afternoons per week.

830. Electrical Engineering Seminar. Electrical Engineering Course. Continuation of Course 729.

840. Electrical Engineering Thesis. Electrical Engineering Course. Preparation of a thesis on some Electrical Engineering subject—the designing and construction of some electrical machine or measuring instrument, the efficiency test and critical study of some dynamo-electric machine or power plant, or of electrical research work of special direction. Four hours credit per week.

DEPARTMENT OF MINING ENGINEERING.

SAMUEL WALKER BEYER, PROFESSOR.

LAURENCE C. HODSON AND IRA A. WILLIAMS, ASSOCIATE PROFESSORS.

C. E. ELLIS, INSTRUCTOR.

The courses in Mining Engineering are planned to give the student a ready familiarity with the branches which form the ground work of the science of Mining and Metallurgy. The Department of Mining Engineering aims to give him such a thorough training in the fundamentals as will enable him after graduation to acquire in a comparatively short time the practical experience absolutely necessary before he is fitted to assume positions of great responsibility in the mining industries. The Department offers three courses, a four years', a five years', and a two years' course. The first two are intended for those students who desire a "thorough course in Theoretical and Practical Mining," and underlying sciences, and leads to the degree of Bachelor of Science in Mining Engineering. The requirements for admission are the same as those for admission to the other Engineering Courses. Students who pursue these courses to their completion are expected to be able to undertake the "full management of mining in its various branches," and become familiar with the principles involved and the methods employed in good mining engineering practice in general.

The last course is designed for young men who have had some practical experience in mines, and wish to study mine surveying, drafting, the problems of ventilation, drainage, haulage, mine operation, etc., and also to learn something of the sciences which bear upon their work but have neither the time nor the preparation for a full college course. Elementary mathematics, drawing and shop work receive considerable attention during the first year, while the professional studies are reserved for the second year. Candidates who are twenty-one years of age or over are admitted without examination. All others must give evidence of a thorough grounding in the common branches.

Equipment.

The Department of Mining Engineering occupies six rooms on the third floor and three on the first floor of Engineering Hall and shares in common with the other Engineering departments the blue-print, photographic, Engineering Museum and Assembly rooms. Of the rooms used exclusively by the Department of Mining Engineering, three are used for laboratory purposes only, two for laboratory and lecture purposes, one as a museum, and three afford space for supplies, instruments, books and filing cases, *in addition to their use for office purposes*.

Lecture Room and Laboratory in Mining Engineering.—This room is provided with seventy-five opera chairs with folding arm rests, a wall table cabinet occupying all of the outside wall space and so arranged as to provide excellent working space in front of the windows while the space between the windows is utilized for the filing of study material. Above the wall table, lockers with glass doors are provided, in which students may keep books and small pieces of apparatus free from dust. The windows are all provided with opaque shades and the room with a permanent lantern screen. The balance of the interior wall space is occupied by slate blackboards. A large cabinet lecture table completes the equipment of the room.

Seminar Room.—The seminar room is used for both laboratory and lecture purposes as in the case of the preceding, in addition to serving as a conference room and headquarters for the Junior and Senior students in Mining Engineering. It is equipped with two long tables standing at right angles to and directly connected with a large cabinet lecture table, the whole forming a continuous table in the form of a U. The room has a seating capacity of thirty-six and is equipped with movable revolving chairs, and slate blackboards on the interior walls. In addition the room contains a twenty-two tray filing case for large drawings, plats and maps, and a supply case.

Metallurgical Laboratories.—The laboratories for Metallurgy and Ceramics are located on the ground floor and are fitted with soapstone topped cabinet wall tables occupying all the outside walls and a large fume chamber, supply and display cases. They are supplied with water, gas, compressed air, exhaust and electrical connections. They already contain a Hoskin's No. 4 muffle furnace and a Bosworth assay furnace with the usual accessories for doing metallurgical and ceramic work and several smaller furnaces.

The department is supplied with a Sullivan core drill with a complete set of tools and accessories for carrying on actual field operations, a "Queen" Light Mountain mining transit; two "Berger" No. 4 Mining transits with interchangeable side and top telescopes; a Brunton pocket transit; a sensitive six-dial anemometer reading to ten millions of feet; rods and sighting poles; a set of miner's tools; barometers, clinometer, a series of miner's lamps and various instruments used in ascertaining distances.

The department has received through the generosity of the J. George Leyner Engineering Works, of Denver, Colorado, one Water Leyner Rock Drill with column, condenser, and full complement of steel.

The laboratory in Metallurgy possesses aside from the list of utensils to be found in any well equipped laboratory for these branches of chemical work, the following special pieces of apparatus: Weatherhead mortar and porcelain mortars for pulverizing; forty-four brass brickette molds, chemical balances, torsion balance; Le Chatelier thermo-electric pyrometer; a Seger volumeter; two-jar ball-mill, Sturtevant laboratory crusher; and sample grinder.

The Museum.—The museum for Geology and Mining Engineering is fitted with eight museum cases with sloping glass tops and cabinet bases. The bases supply room for one hundred and ninety-two trays in which the working collections and duplicate material in Geology and Mineralogy are filed. One large central case containing the larger casts of the "Ward Series," a series of cases, showcase tops and cabinet bases, occupy the space between the windows, and permanent cases occupy all the partition wall space.

The offices supply room for apparatus, supplies, books, and filing cases.

LOCATION.

Ames is located conveniently to the Iowa coal fields and students have easy access to the coal mines of Boone and Polk counties. The great centers of the clay industry, Des Moines, Boone, and Fort Dodge, are equally accessible, while the quarries of Marshall county are scarcely more than an hour's ride from the College. These and numerous allied industries are, after all, the most important and indispensable laboratories for the practical mining engineer. The department undertakes to present the accepted theories concerning mineral aggregation, origin and occurrence, but these theories can be put to test only by an intelligent use of the drill, the level and the plane table. The accredited methods of winning the ores and minerals receive full discussion in the class room, but only render obvious the necessity of becoming familiar with the practical workings of the sluice box, the tippie and the stamp mill. The chemical and physical properties of a clay may be ascertained in the laboratory, but a complete knowledge of its properties and its mode of treatment can be gained only by following it from the pit to the street. In short, the department aims to give as complete an exposition of the theories and laws which underlie the science of mining as the time will permit, but the verification and application of these theories and laws must be made, in a large measure, in the field and in the industries.

Investigation Work.

It is the settled policy of the department to carry on such investigation work as may be of benefit to the mining and manufacturing inter-

ests of the state. In coöperation with the other Engineering departments considerable work has been done and is being done on fuels, clays and structural materials. The department is also prepared to do a limited amount of assaying, test clays and fuels, do mine surveying, prepare mine maps and plats, examine and report on mine and clay properties for citizens of the state at reasonable cost. In fact the atmosphere produced by *practical investigation work*, is believed to be necessary to the healthful growth of the engineer, and no opportunity is lost to encourage work along these lines.

Courses in Mining.

The work of the first two years in the four years' course in Mining Engineering is exactly the same as that required in the course in Mechanical Engineering, with the exception that Surveying takes the place of Mechanical Drawing, and the technical lecture is along mining engineering lines. The professional studies are given due prominence during the last two years of the course and the student is required to take continuous work in mining, chemistry and metallurgy, and geology, through the last three semesters. He is expected to make one of these branches the subject of special investigation and to embody the results of such investigation in a thesis, which is required of every student who is a candidate for graduation.

It is generally recognized that there is of necessity a considerable gap between the work included in the College curriculum and that of the professional engineer; and that the student in Engineering must gain the larger part of his professional training outside of college walls. The courses in summer field work are offered in the hope that his apprenticeship may be reduced to a minimum, and are required of all students in the four years' course in Mining Engineering.

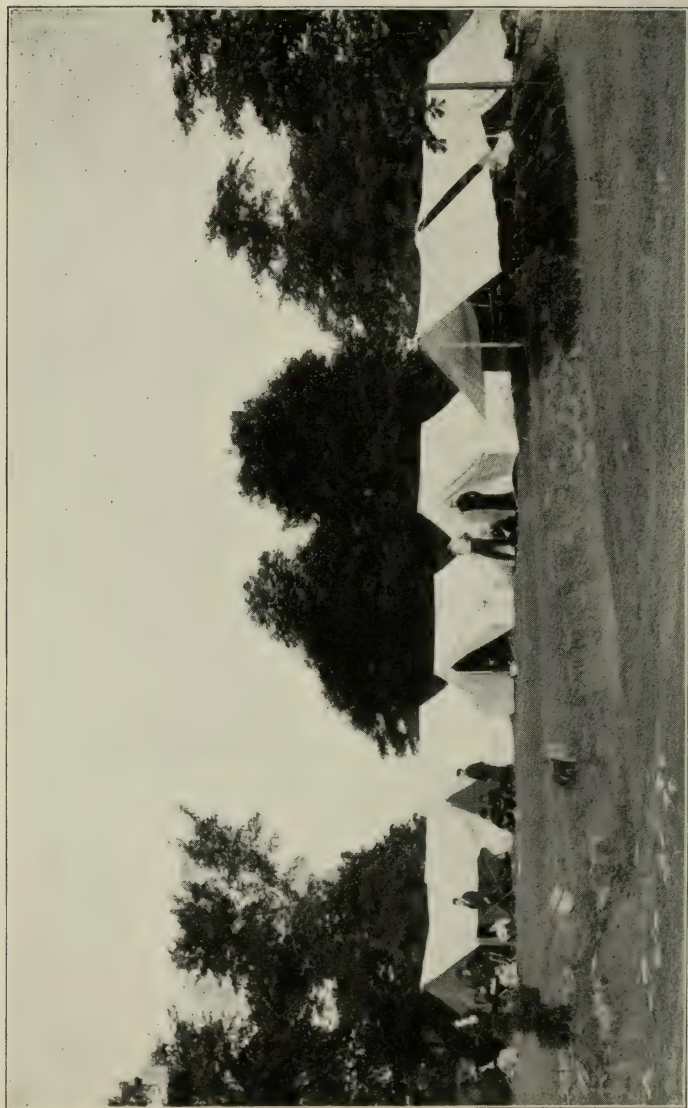
COURSES IN MINING ENGINEERING.

Academic Year.

Any student who at entrance presents satisfactory credit for part of the Academic Course, or who by examination passes part of it satisfactorily, will be classified in such of the remaining work offered in the Academic year as the Dean of the Junior College and the Dean of Engineering shall consider will best prepare him for his college course. After providing in such classification for the remainder of the thirty credits required for entrance to college, the student may complete his schedule by taking up some of the Freshman studies.

FIRST SEMESTER.

		Required semester hours
Mathematics 3	Algebra	5
English 2,	Rhetoric and Composition	5
Modern Languages		



MINING ENGINEERING WORK, BOONE COUNTY, IOWA

The Language selected must be carried through the entire year.

Choice	Language 1,	French 5	5
	Language 5,	German 5	
	Language 30,	Spanish 5	
Civics 1,	Government in State and Nation	2	
Mining Engineering 21,	Elements of Mining	1	
Total semester hours			18

SECOND SEMESTER.

		Required semester hours
Mathematics 5,	Plane Geometry	3
Mathematics 6,	Solid Geometry	2
Literature 12,	English Classics	4
Modern Languages		

The Language selected must be a continuation of the one chosen in the first semester.

Choice	Language 2,	French 5	5
	Language 6,	German 5	
	Language 31,	Spanish 5	
History 16,	The National Period	3	
Mining Engineering 22,	Elements of Mining	1	
Total semester hours			18

FOUR YEAR COURSE IN MINING ENGINEERING.

This course leads to the degree of Bachelor of Science in Mining Engineering. Graduates from this course may receive the professional degree of Engineer of Mines by devoting an additional year to resident study and holding successfully a responsible engineering position for one year, on the presentation of a satisfactory thesis; or by five years' service in responsible engineering work and presentation of thesis.

N. B. ENGINEERING COURSE NUMBERS.—The number in hundreds place indicates the semester in which the subject is taught. If the subject is also taught in a previous semester, the true course number is followed by the descriptive course number in parenthesis.

**Freshman Year.

FIRST SEMESTER.

		Required semester hours
Mathematics 20,	Algebra	4
Mathematics 21,	Plane Trigonometry	1
Modern Languages		

**Freshmen who show deficient preparation in English or Mathematics may be assigned by the Dean of the Junior College and the Dean of Engineering to special classes, with one credit hour more work than indicated above, or in case of clear indication of failure, even with this arrangement, they may be assigned to Academic classes.

The Language selected must be carried through the entire year.

Choice	{ Language 18 or 57,	French 3	3
	{ Language 20 or 73,	German 3	
	{ Language 36 or 45,	Spanish 3	
	English 10,	Narration and Description	3
	Chemistry 41,	General Chemistry	3
	Mechanical Engineering 130,	Shop Work	2
	Mining Engineering 101,	Principles of Mining	
	Mechanical Engineering 121,	Mechanical Drawing	2
	Military 1,	Military Drill	
Total semester hours			18

SECOND SEMESTER.

Required semester
hours

Mathematics 22,	Trigonometry	2
Mathematics 23,	Analytical Geometry	3
Modern Languages		

The Language selected must be a continuation of the one chosen in the first semester.

Choice	{ Language 19 or 58,	French 3	3
	{ Language 21 or 74,	German 3	
	{ Language 37 or 46,	Spanish 3	
	English 11,	Exposition	3
	Chemistry 42,	General Chemistry	3
	Mechanical Engineering 231		
	(331),	Shop Work	2
	Mining Engineering 220,	Principles of Mining	
	Mechanical Engineering 220,	Descriptive Geometry	2
	Military 2,	Military Drill	
	Mining Engineering 212,	Summer field work	

Students who secure remunerative employment during their summer vacations between Freshman-Sophomore and Sophomore-Junior years will be excused from summer field work providing they are so employed for one month, subject to the approval of the heads of the department.

Total semester hours 18

Sophomore Year.

THIRD SEMESTER.

Required semester
hours

Mathematics 24,	Analytical Geometry	2
Mathematics 25,	Calculus	3

English 12,	Argumentation	2
Chemistry 43,	Qualitative Analysis	3
Physics 303,	Mechanics and Heat	5
Civil Engineering 345,	Surveying	2
Mechanical Engineering 322,	Mechanical Drawing	1
Mining Engineering 318,	Journal Club	
Military 3, or Athletics		—
	Total semester hours	18
History 17,	The American People	1
To be taken in Sophomore or Junior year.		

FOURTH SEMESTER.

		Required semester hours
Mathematics 26,	Differential and Integral Calculus	4
Chemistry 46,	Elementary Quantitative Analysis	4
Physics 404,	Electricity and Magnetism and Light and Sound	5
Mechanical Engineering 401,	Analytical Mechanics	3
Civil Engineering 446,	Surveying	2
Mechanical Engineering 483,	Mechanical Drawing	1
Mining Engineering 419,	Journal Club	
Military 4, or Athletics		
Mining Engineering 423,	Summer field work	

Students who secure remunerative employment during their summer vacations between Freshman-Sophomore and Sophomore-Junior years will be excused from summer field work providing they are so employed for one month, subject to the approval of the heads of the department.

	Total semester hours	18
History 18,	American Statesmen	1
To be taken in Sophomore or Junior year.		

Junior Year.

FIFTH SEMESTER.

		Required semester hours
Mechanical Engineering 502,	Analytical Mechanics	5
Mining Engineering 510,	Mine Surveying and Mining Law	4
Geology 501,	Geology	4
Chemistry 48,	Assaying	4

Mechanical Engineering 512,	Mechanical Engineering Laboratory	1
Mining Engineering 506,	Seminar	—
	Total semester hours	18

Optional:

English 7,	Debating	1
History 7,	America in the Far East	2
Economic Science 9,	Outlines of Economics	3
Civics 7,	Comparative Government	2
Literature 13,	Literature	2

SIXTH SEMESTER.

Required semester
hours

Mechanical Engineering 686,	Analytical Mechanics	4
Geology 607,	Geology	4
Mining Engineering 614,	Metallurgy	3
Mining Engineering 602,	Principles of Mining	3
Civil Engineering 656,	Structural Engineering	3
Engineering 603,	Conservation of Natural Resources	1
Mining Engineering 607,	Seminar	
Mining Engineering 613,	Summer field work	

Junior students who secure instructive employment in one of the great metal mining districts of the country will be excused from the Junior summer field work, providing they are so employed for at least six weeks subject to the approval of the head of the department.

Total semester hours 18

Optional:

English 8,	Debating	1
History 9,	The Far Eastern Question	2
Economic Science 9,	Outlines of Economics	3
Economic Science 12,	Engineering Economics	2
Civics 7,	Comparative Government	2
Literature 14,	Literature	2

Senior Year.

SEVENTH SEMESTER.

Required semester
hours

Mining Engineering 715,	Metallurgy	5
Mining Engineering 703,	Principles of Mining	3
Geology 704,	Geology	4
Mechanical Engineering 784,	Steam Engines and Boilers	2
Engineering 702,	Specifications and Contracts	1

Electrical Engineering 712,	Electric Power Transmission and Mining	3
Mining Engineering 708,	Seminar	
Mining Engineering	Thesis begun	

Total semester hours 18

Optional:

English 7,	Debating	1
History 7,	America in the Far East	2
Economic Science 14,	Outlines of Economics	2
Economic Science 12,	Engineering Economics	2
Civics 7,	Comparative Government	2
Literature 13,	Literature	2

EIGHTH SEMESTER.

Required semester
hours

Mining Engineering 804,	Mining	5	
Geology 805,	Geology	4	
Engineering 801,	History of Engineering	1	
Mechanical Engineering 809,	Constructive Engineering	3	
Thesis work			
Choice { Mining Engineering 816,	Special Work in Mining	5	5
{ Mining Engineering 817,	Special Work in Metallurgy	5	
{ Geology 808,	Special Work in Geology	5	
Mining Engineering 809,	Seminar		

Total semester hours 18

Optional:

English 8,	Debating	1
History 9,	The Far Eastern Question	2
Economic Science 12,	Engineering Economics	2
Civics 7,	Comparative Government	2
Literature 14,	Literature	2

TWO YEAR COURSE IN MINING ENGINEERING.

First Year.

FIRST SEMESTER.

Required semester
hours

Mathematics 3,	Algebra	5
Mathematics 5,	Plane Geometry	5
Chemistry 21,	Elementary Experimental Chem- istry	5
Mechanical Engineering 121,	Mechanical Drawing	2

Mechanical Engineering 130,	Shop Work	2
Mining Engineering 101,	Principles of Mining	—
Total semester hours		19

SECOND SEMESTER.

Required semester
hours

Mathematics 6,	Solid Geometry	2
Mathematics 30,	Plane Trigonometry	3
Chemistry 23,	Elementary Experimental Chem- istry	5
Mining Engineering 602,	Principles of Mining	3
Civil Engineering 204,	Descriptive Geometry	2
Mechanical Engineering 331,	Shop Work	2
Mining Engineering 220,	Principles of Mining	—
Total semester hours		17

Second Year.

FIRST SEMESTER.

Required semester
hours

Chemistry 48,	Assaying	4
Civil Engineering 345,	Surveying	2
Mining Engineering 703,	Principles of Mining	4
Physics 303,	Mechanics and Heat	5
Mining Engineering 506,	Seminar	—
Total semester hours		15

SECOND SEMESTER.

Required semester
hours

Civil Engineering 446,	Surveying	2
Mining Engineering 804,	Mining Engineering	4
Mining Engineering 614,	Metallurgy	4
Geology 501,	General Geology	4
Mechanical Engineering 423,	Mechanical Drawing	2
Mining Engineering 607,	Seminar	—
Total semester hours		16

FIVE YEAR COURSE IN MINING ENGINEERING.

The following five year course in Mining Engineering is offered in response to a demand for an engineering course giving the student a better education in the culture studies and the natural sciences together with an opportunity to specialize along certain engineering lines not pos-

sible in the time available in the four year course of study. The course includes all of the work given in the four year course, and in addition affords opportunity to do more work along cultural and scientific lines during the first three years and to elect additional subjects given in the engineering departments during the last two years.

This course leads to the same degree granted to graduates of the four year course. A graduate of the five year course may obtain the full professional degree of Engineer of Mines after one year of responsible professional work and the presentation of a satisfactory thesis.

N. B. ENGINEERING COURSE NUMBERS.—The number in hundreds place indicates the semester in which the subject is taught. If the subject is also taught in a previous semester, the true course number is followed by the descriptive course number in parenthesis.

Freshman Year.

FIRST SEMESTER.

Required semester
hours

Mathematics 20,	Algebra	4
Mathematics 21,	Plane Trigonometry	1
Modern Language		
The Language selected must be continued through the year.		
Choice {	Language 18 or 57, French 3	3
	Language 20 or 73, German 3	
	Language 36 or 45, Spanish 3	
English 10,	Narration and Description	3
History 6,	French Revolution and XIXth Century	3
Mechanical Engineering 121,	Mechanical Drawing	
Mechanical Engineering 130,	Forge Work	2
Mining Engineering 101,	Technical Lecture	
Military 1,	Drill	
Total semester hours		18

SECOND SEMESTER.

Mathematics 22,	Trigonometry	2
Mathematics 23,	Analytical Geometry	3
Modern Language		
The Language selected must be a continuation of the one chosen in the first semester.		
Choice {	Language 19 or 58, French 3	3
	Language 21 or 74, German 3	
	Language 37 or 46, Spanish 3	
English 11,	Exposition	3
Mechanical Engineering 220,	Descriptive Geometry	2
Mechanical Engineering 231,	Wood Shop	2

History 4,	Division and Reunion, 1850 to 1879 3	
Mining Engineering 220,	Technical Lecture	
Military 2,	Drill	
Mining Engineering 212,	Summer field work	
		—
	Total semester hours	18

Sophomore Year.

THIRD SEMESTER.		Required semester hours
Mathematics 24,	Analytical Geometry	2
Mathematics 25,	Calculus	3
English 12,	Argumentation	2
Chemistry 2,	General Chemistry	5
Civil Engineering 308,	Surveying	4
Mechanical Engineering 322,	Mechanical Drawing	1
Military 3, or Athletics		
Elective	Non-technical Work	1
		—
	Total semester hours	18

FOURTH SEMESTER.		
Mathematics 26,	Differential and Integral Calculus	4
English 13,	Advanced Composition	2
Chemistry 5,	Qualitative Analysis	5
Mechanical Engineering 423,	Mechanical Drawing	2
Civil Engineering 409,	Surveying	4
Military 4, or Athletics		
Elective	Non-technical Work	1
Mining Engineering 423,	Summer field work	
		—
	Total semester hours	18

Junior Year.

FIFTH SEMESTER.		Required semester hours
Physics 503 (303),	Mechanics and Heat	5
Economic Science 9,	Outlines of Economics	3
Mining Engineering 510,	Mine Surveying	4
Chemistry 50,	Analytic Chemistry	5
Mechanical Engineering 583,		
(483),	Drawing	1
Mining Engineering 506,	Seminar	
		—
	Total semester hours	18

SIXTH SEMESTER.

Physics 604 (404),	Electricity and Magnetism and	
	Light and Sound	5
Economic Science 15,	Engineering Economics	3
Mechanical Engineering 601 (401),	Analytical Mechanics	3
Geology 607 (501),	Mineralogy	4
Mining Engineering 618,	Assaying	3
Mining Engineering 607 (507),	Seminar	
Mining Engineering 613,	Summer field work	
		—
	Total semester hours	18

Senior Year.

FIRST SEMESTER.

		Required semester hours
Mechanical Engineering 702 (502),	Analytical Mechanics	5
Electrical Engineering 712,	Electric Power Transmission and Mining	3
Physics 723 (523),	Physical Laboratory	1
Geology 701 (501),	General Geology	4
Mining Engineering 708,	Seminar	
Elective		5
		—
	Total semester hours	18

SECOND SEMESTER.

		Required semester hours
Mechanical Engineering 886 (686),	Analytical Mechanics	4
Civil Engineering 811 (611),	Structural Engineering	4
Geology 2	Stratigraphic and Historical Ge- ology	3
Mining Engineering 802 (602),	Mining Engineering	3
Mining Engineering 814 (614),	Metallurgy	3
Mining Engineering 809,	Seminar	
Engineering 803 (603),	Conservation of Natural Resources	1
		—
	Total semester hours	18

Post Senior Year.**FIRST SEMESTER.**

	Required semester hours
Mining Engineering 903 (703), Mining Engineering	4
Mechanical Engineering 984 (784), Steam Engines and Boilers	2
Engineering 902 (702), Specifications and Contracts	1
Geology 904 (704), Petrologic Geology	4
Mining Engineering 915 (715), Metallurgy	5
Elective	2
Mining Engineering 919, Seminar	—
Total semester hours	18

SECOND SEMESTER.

	Required semester hours
Engineering 1001 (801), History of Engineering	1
Civil Engineering 1022 (822), Water Supply Engineering	3
Civil Engineering 1015 (615), Engineering Laboratory	1
Geology 1005 (805), Economic Geology	4
Mining Engineering 1017 (817), Special Work in Mining, Metallurgy or Geology	5
Elective	4
Mining Engineering 1020, Seminar	—
Total semester hours	18

COURSES IN MINING ENGINEERING.

A21. Elements of Mining. Mining Engineering and Ceramics Courses. One hour credit.

B22. Elements of Mining. Mining Engineering and Ceramics Courses. One hour credit.

101. Principles of Mining. Mining Engineering and Ceramics Courses, in connection with the required Shop Work. The student receives instruction in the general and elementary principles of mining in order that he may appreciate something of what he sees and hears before he makes a detailed study of prospecting, exploration, mining methods, and the various subjects included in Courses 602, 703 and 804. Special attention given to mining terms and local mining methods.

212. Summer Field Work in Mine Surveying. Two weeks work required at the close of the Freshman year. The work is carried on in one of the coal mining districts of the state and comprises the complete survey of a mine and a thorough examination of the equipment and mode

of operation of a typical mine for the district, and leads in the first place to a mine map, and in the second to a careful report on mine property accompanied by the necessary illustrations.

220. Principles of Mining. A continuation of Course 101. Mining Engineering and Ceramics Courses in connection with the required Shop Work. The Mining and Metallurgical operations to be seen while on the succeeding Summer Field Trip are studied with as much detail as the time and student's preparation permit.

318. Journal Club. Mining Engineering Course and Ceramics. The work consists of weekly conferences with one or more of the instructors in the department, in which the leading mining journals receive principal attention. Lectures are given occasionally on current topics and the students are encouraged to acquire the habit of reading the technical journals which are to be found on the library shelves.

419. Journal Club. Mining Engineering Course and Ceramics. See Course 318. Continuation of 318.

423. Summer Field Work in Mine Surveying. Two weeks work required at the close of the Sophomore year. The work is carried on in one of the coal mining districts of the state, and comprises the complete survey of a mine and a thorough examination of the equipment and mode of operation of a typical mine for the district, and leads in the first place to a mine map, and in the second to a careful report on mine property accompanied by the necessary illustrations.

506. Seminar. Mining Engineering Course and Ceramics. For the purpose of bringing together the Junior and Senior students and the members of the instructing corps for weekly conferences. A discussion of timely topics by the students.

510. Mine Surveying and Mining Law. Mining Engineering Course. Supplements the work in surveying taken in the Civil Engineering Department. Methods of surveying especially adapted to mines and tunnels. The use of the auxiliary telescope and the various problems met with in underground surveying are illustrated by means of problems taken from actual practice. Also Mineral Land Surveying. As the subject of Mineral Land Surveying necessarily requires some knowledge of the law relating to mining claims, the whole subject of Mining, Mineral and Geological Law is given a rapid review. While an exhaustive study of such laws is impossible the necessity of some knowledge of the law is impressed upon the student and he is shown where he can obtain information on the simpler questions. Recitations, four hours per week

602. Principles of Mining. Mining Engineering Course. Study of methods employed in excavating, boring and shaft sinking, mining and the support of mine excavations; also critical study of methods employed in exploration, development and mine working in general. Recitations, three hours per week.

607. Seminar. Mining Engineering and Ceramics Courses. Continuation of Course 506.

613. Summer Field Work in the Study of Mine Operation and Equipment, and of Concentrating Plants. Four weeks' work required of students who have completed the Junior year. This course necessitates a visit to one of the great metal producing centers outside of the state. A careful study of mine properties is made, and a detailed report, properly illustrated by sketches and drawings, is required. A portion of the time is devoted to a study of ore dressing and concentrating plants.

614. Metallurgy. Mining Engineering and Ceramics Courses. Study of refractory materials, fluxes, fuels and furnaces and the metallurgy of iron and steel; also pyrometry, calorimetry, fire clays and coke; the various metallurgical furnaces studied from working drawings; also an introduction to the science of metallography. Recitations, three hours per week.

618. Assaying. Mining Engineering Five Year Course. Three hours credit.

703. Principles of Mining. Mining Engineering Course. Continuation of Course 602, with special reference to Mining Machinery. The subjects of Haulage, Hoisting, Ventilation, Air Compressors, etc., are studied with as much detail as time permits. Recitations, three hours per week.

708. Seminar. Mining Engineering Course and Ceramics. Continuation of Courses 506 and 607.

715. Metallurgy. Mining Engineering Course. Study of processes relating to copper, lead, silver and zinc. In the time allotted to the work, a study of metallurgy of all the metals could not be made satisfactorily, and it is deemed best to confine the work to the most important metals and the most important processes. Recitations, five hours per week.

804. Mining Engineering. Mining Engineering Course. Ore dressing, amalgamation, cyanidation, mine buildings and general equipment and administration of mines. Recitations and lectures, five hours per week.

809. Seminar. Mining Engineering Course and Ceramics. Continuation of Courses 506, 607 and 708.

816. Mining Engineering. Optional Mining Engineering Course. Mine Examinations and Reports, Mine Accounting, Mine Plant Design. A comparative study of Mine Plants, New Concentration Methods, etc. These and kindred subjects will be taken up though not all during any one year. Instruction by means of lectures, assigned reading and reports. After preliminary work of this character, the student will be required to make designs and reports covering given problems. Students electing this work will be expected to write their graduating theses on subjects introduced in this course. Five hours per week.

817. Metallurgy. Optional Mining Engineering Course. Intended for students who desire to specialize as much as possible in metallurgy. The subjects will be varied from year to year to suit the needs of the individual students. Instruction given by means of assigned readings,

conferences and reports carried on simultaneously with work in the laboratory. Those electing this work will be required to write their graduating theses on subjects introduced in this course. Five hours per week.

919. **Seminar.** Five Year Course in Mining Engineering.

1020. **Seminar.** Five Year Course in Mining Engineering.

COURSES IN GEOLOGY.

501. **General Geology: Dynamic, Structural and Physiographic Geology.** Mining Engineering Course and Ceramics, and elective Science and Agricultural Courses. This course includes a study of the principles which form the groundwork of the Science and is given by means of recitations, lectures, laboratory and field work. Counts four hours per week, three of which are devoted to recitations and lectures, and one to laboratory and field work. Prerequisites, one or more semesters each of Chemistry and Physics. Text-book, Scott's Introduction to Geology, 2nd edition.

607. **Mineralogy.** Mining and elective Science and Agriculture. The first half of the term is devoted to a study of the morphological and physical characters of crystalline substances, while the last half is devoted to descriptive and determinative mineralogy. The course counts four hours and consists of four two hour sessions. Prerequisites, elementary courses in Mathematics, Chemistry and Physics.

704. **Petrologic and Advanced Structural Geology.** Mining Engineering and Ceramics Courses, and elective Science and Agriculture. The first ten weeks of the term are devoted to the study of rocks, their origin, occurrence and association, and the last six weeks to a discussion of principles and problems in Structural Geology. The course counts four hours per week and includes three hours class work and one laboratory or field period per week. Prerequisites, Geology 501 or 803. Four hours credit.

803. **Engineering Geology.** Civil Engineering Course. The course includes a discussion of the fundamental principles of dynamic and structural geology and a study of the common minerals and rocks, especially those important in structural materials. Counts three hours per week and consists of recitations, lectures, laboratory and field work. Prerequisites, Elementary Chemistry, Mechanics and Heat. Text-book, Scott's Introduction to Geology, 2nd edition.

805. **Economic Geology.** Mining Engineering and Ceramics Courses and elective Science and Agricultural Courses. The first ten weeks includes a study of the non-metallics while the remainder of the term is devoted to a study of the ore deposits of the United States, Canada, and Mexico. Especial stress is put upon the principles which govern the mode of occurrence, association and origin of the leading economic products. Prerequisites, Geology 501 or 803, and 704. Counts four

hours and consists of three recitations and one laboratory or field period per week. Four hours credit.

808. Thesis. Students in Mining Engineering electing to write a thesis in geology are required to take five hours special work in geology during the second semester Senior year. This special work may be along any one of the following lines: Economic Geology, Petrology, Dynamic Geology, Structural Geology, Metamorphism, Historical Geology or Stratigraphic Geology.

CERAMICS AND CLAY WORKING.

The Department of Ceramics is established in the College in response to a growing demand for instruction in the silicate industries. The continued development of the clay working interests and the notable recent expansion along all lines of the cement industry have created a demand for technically educated men who are equipped to take the lead in the utilization of the silicate raw materials. Inquiries for qualified men along these lines have come from various sources but at the present time the demand is far greater than the supply.

The term "Ceramics" has come to include within its scope the several phases of that branch of engineering which has to do with the investigation and development of all materials which enter into any of the silicate products. Besides clay and cement, therefore, glass making, sandlime brick manufacture, and all mortar work into which natural silicates or silicate forming processes enter are properly embraced in the definition of the word.

The ceramic processes proper are pre-eminently a phase of chemical engineering and depend upon the principles of technical chemistry. Along with this application of chemical principles must go, however, a thorough familiarity with good mechanical engineering practice and in this line a knowledge of surveying and the principles of electricity is also essential. The ceramist must likewise possess a knowledge of geology which will enable him to intelligently prospect for raw materials and to take advantage of geological features in their utilization. An acquaintance with metallurgical principles, especially those relating to the value of fuels and their combustion and the properties of slags is indispensable, for upon the application of this knowledge may frequently depend the success, or failure of large enterprises.

It is the design of the course in Ceramics to prepare and equip engineers to (a) intelligently exploit deposits of suitable raw materials, (b) to comprehend and apply economical methods to the winning of such materials, (c) to design and put into operation plants for their utilization and, (d) to take responsible charge of any and all technical processes connected with the manufacture of the finished products. To accomplish this, not only are the principles laid down in the class room and theories explained but these principles and theories

are verified and applied in the laboratory and in the field. Students are also required to study the methods employed in some of the leading establishments of the state and are encouraged to spend their vacations in practical work at some of these plants.

The Iowa Brick and Tile Association, while in session at Sioux City in 1899, passed a resolution requesting the trustees of the College to take up the investigation of the clays and the clay industries of the state. Similar resolutions were passed at each succeeding annual convention of the association. In 1906 both the Iowa Brick and Tile Association and the Iowa Cement Users Association passed resolutions favoring the establishment of a "School of Ceramics" and providing for the investigation of the raw materials available for the silicate industries. Each organization appointed a committee to take the matter before the legislature then in session and secure the necessary legislation.

After a conference of the joint committee in Des Moines the following bill was prepared, presented to the legislature, and passed by that body:

To provide for the establishment of a course of practical and scientific instruction and investigation in the art of clay working and ceramics including the manufacture and use of cements and allied industries in the Iowa State College of Agriculture and Mechanic Arts.

Section 1. Be it enacted by the general assembly of the State of Iowa that the Trustees of the Iowa State College of Agriculture and Mechanic Arts be, and are hereby required to establish in said college a department of ceramics for the technical and practical education of clay workers, cement manufacturers and other allied pursuits in all branches of those arts which exist in this state and can be profitably introduced and maintained in this state from the mineral resources thereof; including the geology and properties of clays, cement materials, fuels, and other minerals required, and the testing of the products thereof; also the manufacture of fire brick, pressed brick, paving brick, and the glazed and enameled brick of all kinds, of sewer pipe, drain tile, fire proofing and terra cotta, of pottery, porcelain, china, and other specialties; also including the details of the manufacture and uses of cement and the details of other allied industries.

Section 2. Be it further enacted, that the said College shall provide as a part of its Engineering Experiment Station work for the investigation of clays, cement materials, fuels, and other mineral resources of the state with especial reference to their economic uses, and for the publication and dissemination of information useful to such industries and for testing the products thereof.

At the 1907 and 1908 meetings of the Brick and Tile Association and the Iowa Association of Cement Users, strong resolutions were again passed favoring the development of ceramic investigations and the support by the state of a department of instruction in this line of work.

In accordance with the spirit of the act establishing the department it is the desire to continue in coöperation with the Engineering Experiment Station the investigation of promising deposits of raw materials in different parts of the state. It is the policy of the department to serve the interests of the people of the state and to carry on such experiments as may seem required to determine the suitability of materials that appear to be available for any ceramic purpose.

Courses in Ceramics.

Two courses are offered in Ceramics; a two year and a four year course. The shorter course is the equivalent of the short course in Mining Engineering while the longer course is coördinate with the four year courses offered in Mechanical, Civil, Electrical, and Mining Engineering.

COURSE IN CERAMICS.

Academic Year.

Any student who at entrance presents satisfactory credit for part of the Academic Course, or who by examination passes part of it satisfactorily, will be classified in such of the remaining work offered in the Academic year as the Dean of the Junior College and the Dean of Engineering shall consider will best prepare him for his college course. After providing in such classification for the remainder of the thirty credits required for entrance to college, the student may complete his schedule by taking up some of the Freshman studies.

N. B. Engineering Course Numbers. The number in hundreds place indicates the semester in which the subject is taught. If the subject is also taught in a previous semester, the true course number is followed by the descriptive course number in parenthesis.

FIRST SEMESTER.

		Required semester hours
Mathematics 3,	Algebra	5
English 2,	Rhetoric and Composition	5
Modern Languages		
The Language selected must be carried through the entire year.		
Choice {	Language 1,	5
	Language 5,	
	Language 30,	
Civics 1,	French 5}	5
Mining Engineering 21,	German 5}	
	Spanish 5}	
	Government in State and Nation	2
	Elements of Mining	1
Total semester hours		18

SECOND SEMESTER.

		Required semester hours
Mathematics 5,	Plane Geometry	3
Mathematics 6,	Solid Geometry	2
Literature 12,	English Classics	4
Modern Languages		
The Language chosen must be a continuation of the one chosen is the first semester.		
Choice { Language 2,	French 5 }	5
Language 6,	German 5 }	
Language 31,	Spanish 5 }	
History 16,	The National Period	3
Mining Engineering 22,	Elements of Mining	1
		—
	Total semester hours	18

****Freshman Year.**

FIRST SEMESTER.

		Required semester hours
Mathematics 20,	Algebra	4
Mathematics 21,	Plane Trigonometry	1
Modern Languages		
The Language selected must be continued through the entire year.		
Choice { Language 18 or 57,	French 3 }	3
Language 20 or 73,	German 3 }	
Language 36 or 45,	Spanish 3 }	
English 10,	Narration and Description	3
Chemistry 41,	General Chemistry	3
Mechanical Engineering 130,	Shop Work	2
Mechanical Engineering 121,	Mechanical Drawing	2
Mining Engineering 101,	Principles of Mining	
Military 1,	Military Drill	
		—
	Total semester hours	18

SECOND SEMESTER.

Required semester
hours

****Freshmen** who show deficient preparation in English or Mathematics may be assigned by the Dean of the Junior College and the Dean of Engineering, to special classes, with one credit hour more work than indicated above, or in case of clear indication of failure, even with this arrangement, they may be assigned to Academic classes.

Mathematics 22,	Trigonometry	2
Mathematics 23,	Analytical Geometry	3
Modern Languages		

The Language selected must be a continuation of the one chosen in the first semester.

Choice {	Language 19 or 58,	French 3	}	3
	Language 21 or 74,	German 3		
	Language 37 or 46,	Spanish 3		
	English 11,	Exposition		3
	Chemistry 42,	General Chemistry		3
	Mechanical Engineering 231 (331),	Shop Work		2
	Mining Engineering 220,	Principles of Mining		
	Mechanical Engineering 220,	Descriptive Geometry		2
	Military 2,	Military Drill		
	Mining Engineering 212,	Summer Field Work		

Students who secure remunerative employment in the silicate industries during their summer vacation will be excused from summer field work, providing they are so employed for one month, subject to the approval of the head of the department.

Total semester hours	18
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Sophomore Year.

THIRD SEMESTER.

		Required semester hours
Mathematics 24,	Analytical Geometry	2
Mathematics 25,	Calculus	3
English 12,	Argumentation	2
Chemistry 43,	Qualitative Analysis	3
Physics 303,	Mechanics and Heat	5
Civil Engineering 345,	Surveying	2
Mechanical Engineering 322,	Mechanical Drawing	1
Mining Engineering 318,	Journal Club	
Military 3, or Athletics		

Total semester hours	18	
History 17,	The American People	1

To be taken in the Sophomore or Junior year.

FOURTH SEMESTER.

		Required semester hours
Mathematics 26,	Differential and Integral Calculus	4
Chemistry 46,	Elementary Quantitative Analysis	4
Physics 404,	Electricity and Magnetism and Light and Sound	5
Civil Engineering 446,	Surveying	2
Mechanical Engineering 401,	Analytical Mechanics	3
Mechanical Engineering 483,	Mechanical Drawing	1
Mining Engineering 419,	Journal Club	
Military 4, or Athletics		
Mining Engineering 423,	Summer Field Work	

Students who secure remunerative employment in the silicate industries during their summer vacation will be excused from summer field work, providing they are so employed for one month, subject to the approval of the head of the department.

	Total semester hours	19
History 18,	American Statesmen	1
To be taken in the Sophomore or Junior year.		

Junior Year.

FIFTH SEMESTER.

		Required semester hours
Mechanical Engineering 502,	Analytical Mechanics	5
Ceramics 501,	Ceramic Chemistry	5
Geology 501,	General Geology	4
Mechanical Engineering 503,	Materials of Construction	3
Physics 523,	Physical Laboratory	1
Mining Engineering 506,	Seminar	
	Total semester hours	18
Optional:		
History 7,	America in the Far East	2
English 7,	Debating	1
Civics 7,	Comparative Government	2
Literature 13,	Literature	2

SIXTH SEMESTER.

		Required semester hours
Mechanical Engineering 686,	Analytical Mechanics	4
Ceramics 602,	Ceramics	5
Civil Engineering 656,	Structural Engineering	3
Mining Engineering 614,	Metallurgy	3
Engineering 603,	Conservation of Natural Resources	1
Mechanical Engineering 613,	Engineering Laboratory	1
Mining Engineering 607,	Seminar	
Mining Engineering 613,	Summer Field Work	

Junior students who secure instructive employment in one of the great clay working or cement manufacturing districts of the country will be excused from the Junior summer field work, providing they are so employed for at least six weeks, subject to the approval of the head of the department.

	Total semester hours	17
Optional:		
History 9,	Far Eastern Question	2
English 8,	Debating	1
Civics 7,	Comparative Government	2
Literature 14,	Literature	2

Senior Year.

SEVENTH SEMESTER,

		Required semester hours
Ceramics 704,	Ceramics	5
Ceramics 703,	Ceramic Chemistry	5
Geology 704,	Geology	4
Mechanical Engineering 784,	Steam Engines and Boilers	2
Engineering 702,	Specifications and Contracts	1
Ceramics 705,	Ceramics	1
Mining Engineering 708,	Seminar	

	Total semester hours	18
Optional:		
History 7,	America in the Far East	2
Civics 7,	Comparative Government	2
Economic Science 12,	Engineering Economics	2
Literature 13,	Literature	2

EIGHTH SEMESTER.

		Required semester hours
Ceramics 806,	Ceramics	5
Mechanical Engineering 809,	Constructive Engineering	3
Geology 805,	Geology	4
Engineering 801,	History of Engineering	1
Ceramics 807,	Special and Thesis	5
Mining Engineering 809,	Seminar	—
	Total semester hours	18
Optional:		
History 9,	The Far Eastern Question	2
Civics 7,	Comparative Government	2
Economic Science 12,	Engineering Economics	2
Literature 14,	Literature	2

Two Year Course in Clay Working.

The short course in clay working is designed to accommodate men already engaged in practice who may not have at their disposal sufficient time to take the four year course or who may not have had the opportunity to prepare themselves to meet the entrance requirements to the long course. It aims to equip such persons for advancement by presenting the essential principles of the various operations involved in the production of clay wares. The several subjects treated in this course are arranged in sequential order and as far as possible the principles discussed in the classroom are verified in the laboratory and the field. The preliminary studies of the first year are essential as a foundation for the understanding and prosecution of the more specialized work of the last two semesters. This course is planned to render the same sort of service to clay-workers as does the two year course in Mining Engineering to practical miners.

TWO YEAR COURSE IN CLAY WORKING.

First Year.

FIRST SEMESTER.

		Required semester hours
Mathematics 3,	Algebra	5
Mathematics 5,	Plane Geometry	5
Chemistry 21,	Elementary Experimental Chemistry	5
Mechanical Engineering 121,	Mechanical Drawing	2

Mechanical Engineering 130,	Shop Work	2
Mining Engineering 101,	Principles of Mining	—
	Total semester hours	19

SECOND SEMESTER.

		Required semester hours
Mathematics 6,	Solid Geometry	2
Mathematics 30,	Plane Trigonometry	3
Chemistry 23,	Elementary Experimental Chem- istry	5
Ceramics 602,	Ceramics	4
Mechanical Engineering 220,	Descriptive Geometry	2
Mechanical Engineering 231 (331),	Shop Work	2
Mining Engineering 220,	Principles of Mining	—
	Total semester hours	18

Second Year.

FIRST SEMESTER.

		Required semester hours
Ceramics 501,	Ceramic Chemistry	5
Ceramics 704,	Ceramics	5
Physics 303,	Mechanics and Heat	5
Civil Engineering 345,	Surveying	2
Mining Engineering 506,	Seminar	—
	Total semester hours	17

SECOND SEMESTER.

		Required semester hours
Ceramics 703,	Ceramic Chemistry	5
Ceramics 806,	Ceramics	5
Geology 501,	General Geology	4
Civil Engineering 446,	Surveying	2
Mechanical Engineering 423,	Mechanical Drawing	2
Mining Engineering 607,	Seminar	—
	Total semester hours	18

COURSES IN CERAMICS.

501. Ceramic Chemistry. Quantitative analysis of raw materials used in the clay and cement industries. Especial attention is given to silicate minerals, beginning with those of simpler composition and progressing as far as possible in the analysis of the more complex clays, feldspar, etc. Five hours credit. Recitations, two hours, and three laboratories per week.

602. Ceramics. Classification, properties and methods of winning clays and other materials used in the ceramic industries. Laboratory work in clay testing accompanying. Five hours in course in Ceramics and four hours in course in Clay Working.

703. Ceramic Chemistry. Course 501 continued. Rational analysis of clays and pottery bodies, chemical calculations. Five hours credit. Two recitations and three laboratories per week.

704. Ceramics. Manufacture of clay wares, including preparation of the clay, formation of the ware, drying and burning. Five lectures per week.

705. Ceramics. Visits to important clay and cement working centers. Careful study and written reports on the plants inspected. One hour credit.

806. Ceramics. Manufacture and technique of glazes, enamels, cements, and cement products. Five hours credit, Three recitations and two laboratories per week.

807. Ceramics. Quantitative analysis and compounding of bodies, glazes and cements. Special problems, some one of which shall be the basis for a thesis. Five hours credit. Two recitations and three laboratory periods per week.

SUMMARY ENGINEERING COURSES.

Mechanical Engineering Courses.

NOTE.—(The numbers after the hyphens indicate additional courses required of students taking the Five Year Course.)

	Four Year Course	Five Year Course
Chemistry { 41 (3), 42 (3), 43 (3), 45 (2). { 2 (5), 5 (5).	11	10
Civil Engineering 855 (2), -345 (2), 446 (2), 721 (3).	2	9
Economic Science 9 (3), -14 (3).	3	6
Electrical Engineering { 610 (3), 717 (1), 815 (3), 818 (1). { 610 (3), 720 (2), 815 (3), 818 (1).	8	9
Engineering 603 (1), 702 (1), 801 (1).	3	3
English 10 (3), 11 (3), 12 (2).	8	8

History 17 (1), 18 (1), -4 (3), 6 (3).	2	8
Mathematics 20 (4), 21 (1), 22 (2), 23 (3), 24 (2), 25 (3), 26 (4).	19	19
Mechanical Engineering 117 (R), 121 (2), 130 (2), 218 (R), 220 (2), 232 (2), 322 (1), 331 (2), 401 (3), 423 (2), 437 (1), 439 (1), 502 (5), 503 (3), 512 (1), 524 (1), 533 (2), 541 (2), 605 (3), 606 (5), 613 (1), 625 (1), 634 (2), 642 (1), 704 (3), 707 (2), 708 (3), 714 (1), 726 (2), 735 (2), 743 (R), 819 (3), 811 (4), 815 (1), 827 (3), 844 (R).	69	69
Military 1, 2, 3 or Athletics, 4 or Athletics	R	R
Modern Languages (3), (3).	6	6
Physics 303 (5), 404 (5), 506 (3), 523 (1), 615 (1).	15	15
Electives (2), (4), (2), (2), (3), (5).		18
Totals	146	180

Civil Engineering Courses.

NOTE.—(The numbers after the hyphens indicate additional courses required of students taking the Five Year Course.)

	Four Year Course	Five Year Course
Chemistry { 41 (3), 49 (4). { 2 (5), 5 (5).	7	10
Civil Engineering 101 (1), 102 (2), 141 (R), 203 (1), 204 (2), 231 (R), 242 (R), 305 (1), 308 (4), 343 (R), 349 (1), 407 (1), 409 (4), 432 (R), 444 (R), 450 (1), 510 (5), 514 (1), 524 (2½), 527 (R), 603 (1), 611 (4), 615 (1), 617 (4), 628 (R), 633 (R), 653 (2), 712 (2), 716 (1), 718 (4), 721 (3), 723 (2), 725 (R), 729 (R), 819 (2), 820 (2), 822 (3), 826 (3), 830 (R).	61½	
For Five Year Course add 206 (1) and omit 603 (1).		61½
Choice { Civil Engineering 738 (3), 839 (3). { Civil Engineering 754 (1), 834 (3). { Mechanical Engineering 788 (2). { Civil Engineering 735 (3), 836 (3).	6	
Economic Science 14 (2), -9 (3), 15 (3).	2	6
Electrical Engineering 503 (2).	2	2
Engineering 702 (1); 801 (1), -603 (1).	2	3
English 10 (3), 11 (3), 12 (2), -13 (2).	8	10
Geology 803 (3).	3	3
History 17 (1), 18 (1), -6 (3), 4 (3).	2	6
Mathematics 20 (4), 21 (1), 22 (2), 23 (3), 24 (2), 25 (3), 26 (4), 27 (1½).	20½	20½
Mechanical Engineering 181 (1), 401 (3), 502 (5), 686 (4), 784 (2).	15	15

Military 1, 2, 3 or Athletics, 4 or Athletics	R	R
Modern Languages (3), (3).	6	6
Physics 303 (5), 404 (5), 523 (1).	11	11
Electives (2), (3), (4), (5), (4), (2), (3), (3).		26
	<hr/>	<hr/>
Totals	146	180

Electrical Engineering Courses.

NOTE.—(The numbers after the hyphens indicate additional courses required of students taking the Five Year Course.)

	Four Year Course	Five Year Course
Chemistry { 41 (3), 42 (3), 43 (3), 45 (2). { 2 (5), 5 (5).	11	10
Civics 6 (3).		3
Civil Engineering { 751 (3). { 345 (2), 446 (2).	3	4
Economic Science 9 (3), -12 (3).	3	6
Electrical Engineering 101 (R), 202 (R), 604 (4), 619 (1), 708 (4), 713 (1), 720 (2), 724 (2), 729 (R), 809 (3), 816 (3), 821 (2), 825 (2), 830 (R), 840 (4).	28	
For the Five Year Course omit 713 (1).		27
Engineering 603 (1), 702 (1), 801 (1).	3	3
English 10 (3), 11 (3), 12 (2), -13 (2).	8	10
Geology 501 (4).		4
History 17 (1), 18 (1), -4 (3), 6 (3).	2	8
Literature 13 (2), 14 (2).		4
Mathematics 10 (2), 20 (4), 21 (1), 22 (2), 23 (3), 24 (2), 25 (3), 26 (4).	21	21
Mechanical Engineering 121 (2), 130 (2), 220 (2), 232 (2), 322 (1), 331 (2), 401 (3), 423 (2), 437 (1), 439 (1), 502 (5), 503 (3), 512 (1), 533 (2), 613 (1), 686 (4), 689 (2), 784 (2), 809 (3).	41	
For the Five Year Course add 634 (2), 605 (2), 606 (4), and omit 686 (4), 689 (2), 809 (3).		40
Military 1, 2, 3 or Athletics, 4 or Athletics.	R	R
Modern Languages (3), (3).	6	6
Physics 303 (5), 404 (5), 506 (3), 514 (2), 607 (3), 617 (2).	20	20
Electives (2), (2), (4), (3), (3).		14
	<hr/>	<hr/>
Totals	146	180

Mining Engineering Courses.

NOTE.—(The numbers after the hyphens indicate additional courses required of students taking the Five Year Course.)

		Four Year Course	Five Year Course
Chemistry	{ 41 (3), 42 (3), 43 (3), 46 (4), 48 (4). 2 (5), 5 (5), 50 (5).	17	15
Civil Engineering	{ 345 (2), 446 (2), 656 (3). 308 (4), 409 (4), 611 (4), 822 (3), 615 (1).	7	16
Economic Science	9 (3), 15 (3).		6
Electrical Engineering	712 (3).	3	3
Engineering	603 (1), 702 (1), 801 (1).	3	3
English	10 (3), 11 (3), 12 (2), 13 (2).	8	10
Geology	501 (4), 607 (4), 704 (4), 805 (4), -2 (3).	16	19
History	{ 17 (1), 18 (1). 6 (3), 4 (3).	2	6
Mathematics	20 (4), 21 (1), 22 (2), 23 (3), 24 (2), 25 (3), 26 (4).	19	19
Mechanical Engineering	121 (2), 130 (2), 231 (2), 220 (2), 322 (1), 401 (3), 483 (1), 502 (5), 512 (1), 686 (4), 784 (2), 809 (3).	28	
For Five Year Course	add 423 (2), and omit 512 (1), 809 (3).		26
Military	1, 2, 3 or Athletics, 4 or Athletics.	R	R
Mining Engineering	101 (R), 220 (R), 212 (R), 318 (R), 419 (R), 510 (4), 506 (R), 602 (3), 614 (3), 607 (R), 613 (R), 715 (5), 703 (3), 708 (R), 804 (5), 809 (R).	23	
For Five Year Course	add 618 (3), 919 (R), 817 (5), 1020 (R), and omit 804 (5).		26
Modern Languages	(3), (3).	6	6
Physics	303 (5), 404 (5), -523 (1).	10	11
Thesis	{ Mining Engineering 816 (5). Mining Engineering 817 (5). Geology 808 (5).	5	
Electives	(1), (1), (5), (3), (4).		14
Totals		147	180

Ceramics Course.

Ceramics 501 (5), 602 (5), 703 (5), 704 (5), 705 (1), 806 (5), 807 (5).	31
Chemistry 41 (3), 42 (3), 43 (3), 46 (4).	13
Civil Engineering 345 (2), 446 (2), 656 (3).	7
Engineering 603 (1), 702 (1), 801 (1).	3
English 10 (3), 11 (3), 12 (2).	8
Geology 501 (5), 704 (4), 805 (4).	13
History 17 (1), 18 (1).	2
Mathematics 20 (4), 21 (1), 22 (2), 23 (3), 24 (2), 25 (3), 26 (4).	19
Mechanical Engineering 121 (2), 130 (2), 220 (2), 331 (2), 322 (1), 401 (3), 483 (1), 502 (5), 503 (3), 613 (1), 686 (4), 784 (2), 809 (3).	31
Military 1, 2, 3 or Athletics, 4 or Athletics	R
Mining Engineering 101 (R), 220 (R), 212 (R), 318 (R), 419 (R), 423 (R), 506 (R), 607 (R), 613 (R), 614 (3), 708 (R), 809 (R).	3
Modern Language (3), (3).	6
Physics 303 (5), 404 (5), 523 (1).	11
Total	147

Engineering Experiment Station

While the principal business of the several Engineering departments of the College is perhaps to give instruction to their students, the fact is recognized that the state contributes largely to the financial support of the College and that in return, not only should the College give tuition to the youth of Iowa, but it should contribute as much as possible to the successful carrying on of the industrial interests of the state. By the establishment of experiment stations the national government has recognized the duty of the land grant colleges to the agricultural interests. The Engineering departments of this College believe that it is their proper business to aid the other industrial enterprises of the state.

With this thought as the motive, the several Engineering departments have undertaken during the past twelve years and will continue in the future to undertake to carry on investigations of interest and value to the industries of Iowa, as need therefor may arise, in so far as the funds available will permit. A number of pamphlets and bulletins giving the results of some of these investigations have already been published, and have been received with much favor by the people of the state. By strong resolutions numerous industrial and public organizations in Iowa have expressed their approval of this work.

In recognition and furtherance of this work the 31st General Assembly has appropriated a specific annual sum for the establishment of an Engineering Experiment Station, for carrying on and publishing bulletins of investigations of value to the industrial and municipal interests of Iowa.

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Work of the Engineering Experiment Station.

One of the most important lines of investigation already undertaken is sewage disposal. The first sewage disposal plant in Iowa was constructed at the College in 1898 and has been in highly successful operation ever since. The authorities of many cities in the state have visited it. The College is continually carrying on investigations in sewage disposal, both with the large plant and with smaller experimental plants. Among the special subjects now being investigated may be mentioned those of the disposal of creamery sewage, and small plants, built for less than \$100 each, for disposing of the sewage of private houses.

In addition a representative of the Engineering Experiment Station each year visits all the sewage disposal plants of the state, making tests of the efficiency and securing the data of the operation of the plants. The results of these examinations and of other investigations are published in bulletin form for free distribution.

Another line of investigation has been tests of building materials, which have also been under way for several years. Thousands of such tests, of all kinds of building materials in Iowa, have been made and the results published for the benefit both of the manufacturers and the consumers of the state.

Investigations helpful to the clay interests of the state have been under way for some years, and additional equipment is being put in for this work. Opportunity is provided whereby anyone can send to the Experiment Station samples of clay, to be tested as to suitability for material for brick, tile or other clay wares.

During past years the Mining Engineering Section of the Station has been engaged in careful investigation of cement materials of the state. A very large number of samples of materials have been sent in from different parts of the state and have been carefully analyzed and studied as to their availability as cement materials. This work has been done in coöperation with the State Geological Survey.

The investigations of Iowa coals have been of much value to the manufacturers and to the mining interests of the state, as has been shown by the large demand for the bulletin already published. This work is being continued and largely extended.

It is planned to conduct a statistical inquiry of the power plants of the state, with personal examination of each plant and study its conditions. The results of this investigation will be helpful in suggesting improvements in methods and systems in Iowa power plants.

Careful tests of electric lamps have been made a special feature of the Engineering Experiment Station work. Any city or corporation can now send its lamps to the station (which has been made the official testing station of the Iowa Electrical Association) and have careful tests of efficiency, candle power and durability made at short notice and slight cost, and thus determine whether it is getting proper return for the money paid for its lamps. Many such lamps are being sent in, and in addition special investigations along this line are being conducted, the results of which will be published in bulletin form.

An investigation of the properties of Iowa limes as compared with those from other states has been completed, and a bulletin of the results published.

During the past year especial attention has been given to investigation along the line of drainage engineering. Up to the present time data did not exist by which drainage engineers can compute the sizes of ditches

and drains required under different conditions in this state, and, undoubtedly, very large sums of money are being wasted on account of mistakes in drainage engineering. For two years we have been making gaugings of the actual flow of tile in our drainage systems and have secured important results during the past year which are to be published immediately in bulletin form.

In addition, the Engineering Experiment Station has been engaged in making very extensive investigations of the merits and defects of cement drain tile as compared with clay drain tile and has accumulated a large mass of data on the subject. A bulletin on this subject is to be published in the immediate future.

The above is only a part of the work done or planned by the Engineering Experiment Station.

TESTS OF MATERIALS.

More and more the cities and other public bodies of the state, together with private corporations, are sending in samples of various materials to be tested in the laboratories of the Engineering Experiment Station.

Many places are having their cements tested to see whether they are up to specifications.

The same is true of brick, both for paving and building purposes.

Steel, iron, stone, wood, and other materials of construction can be sent in for tests to advantage

Users of cement are sending samples of their sands for tests, to select the best.

Many samples of clay are received for analysis, test, and report as to value.

Many samples of cement and clay drain tile and sewer pipe are submitted for tests.

Ores are received for assaying work.

Coal can be sent in for test of its calorific value for fuel, and the absence of deleterious elements.

Electric lamps are being sent in by many cities and corporations for test to decide whether they are up to the representations on which they were bought.

All such testing work for the people of Iowa is done at bare cost. We invite further work of this kind, and promise our best efforts to be of assistance to all residents of the state along these and similar lines.

IOWA STATE HIGHWAY COMMISSION.

A. MARSTON,
C. F. CURTISS,
Directors.

THOS. H. MACDONALD,
Highway Engineer.

J. B. DAVIDSON,
Engineer of Road Machinery.

J. E. KIRKHAM,
Consulting Bridge Engineer.

C. S. NICHOLS,
Secretary.

Establishment of the Commission.

By act of the 30th General Assembly the College was constituted the State Highway Commission of Iowa and a small appropriation was made for road investigation and experimentation. It was made the duty of the Commission to obtain data from the counties and townships relating to road conditions; to furnish expert assistance to the several counties when called upon by the proper county officials; to prepare standard plans and specifications for road and bridge work, and to conduct each year a school of instruction for road workers at the College.

The 31st General Assembly increased the appropriation for the work and placed it on an annual basis.

Work of the Commission.

Since July, 1904, the Commission has been actively engaged in carrying out the provisions of the law as outlined above. A large amount of general and detailed information has been collected in various ways. In the 1905 census a supplementary card called the Agricultural Road Schedule was added and in this way complete detailed figures secured of the amount of traffic over the country roads from each farm. The results from several counties which have been worked up so far give promise of amazing totals for the entire state.

A number of tests of both stone and gravel for road material have been made in the Road Materials Laboratory and these tests will be continued to cover all the principal deposits in the state. Such material when sent in by road officials is tested free of charge. There has been

a considerable demand for both the standard cross sections of roads and the plans of concrete bridges which have been developed by the Commission. No attempt, however, is made to make certain standard structures fit all places, and whenever it is necessary a personal visit is made to the county and plans made after all information available has been secured.

Quite a representative line of machinery has been placed at the College by the companies manufacturing the different kinds. Short stretches of experimental gravel and stone roads have been constructed.

School of Instruction for Road Officers.

The first school for road officers was held in June, 1905, the second in August, 1906, the third in September, 1907, and the fourth in August, 1908. Regular instruction is given in road grading, culvert and bridge building, road laws, and such subjects as are of pertinent interest to road men generally. Each county and township board is urged to pay the expenses of at least one representative, as it is felt the experience gained and the new ideas acquired will prove of much value in the local work.

Bulletins Published.

Such material as was of value has been incorporated in the various publications of the Commission.

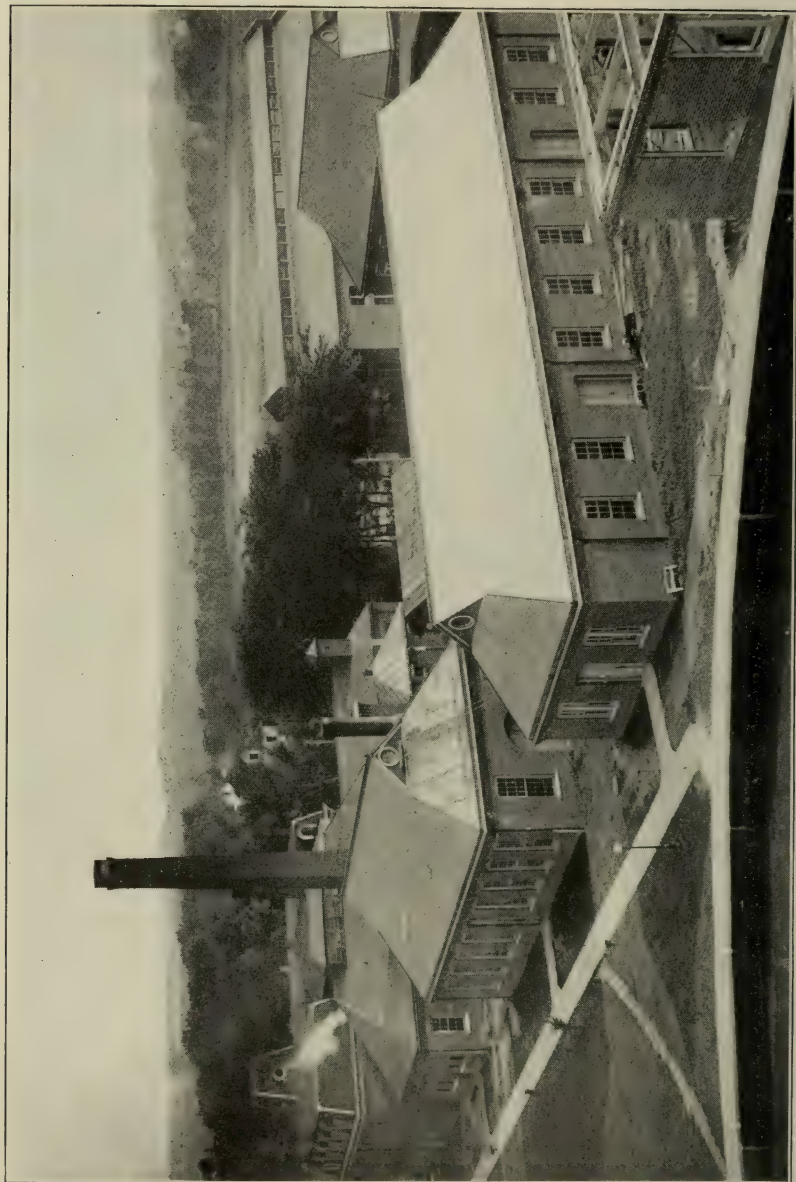
"The Good Roads Problem in Iowa" takes up the subject from a broad general standpoint. It points out the general ways in which the road money is handled and the saving that could be effected with some system applied to this work. This bulletin was issued before much detailed information was available.

"The Manual for Highway Officers" is a 102-page booklet, containing a digest of the road laws; information in regard to the general topographic features as they affect road building; ways and methods of road building and maintenances and plans and instructions for the use of concrete in culverts and bridges.

"The Annual Report of the Iowa Highway Commission, 1904-5." A pamphlet of 75 pages giving a detailed report of the operations of the Commission with an itemized statement of expenditures. The subjects for legislation were also discussed.

"1906 Revision, Manual for Highway Officers." The Manual was revised entirely in 1906 and much new material added. The new material added is chiefly along the lines of road construction and the use of concrete.

"1907 Report." The second annual report. The general subjects are the same as for the first report.



LABORATORY AND SHOPS

"Road Improvement in 1908." A short bulletin containing practical suggestions relative to road dragging, drainage, culvert building, and maintenance, for road workers.

"The Annual Reports of the Iowa Highway Commission," for the years 1906-7 and 1907-8 incorporated in biennial report. A third report of the Commission containing an outline and suggested legislation for developing a practical administrative system; a summary of work accomplished during the existence of the Commission; financial reports; road laws, and comparative sections of roads built in other states.

All of these publications can be obtained by writing to the Commission.

The aim of the Highway Commission is to build up an engineering and advisory bureau to furnish practical aid to the counties and at the same time to carry on experiments and demonstrations of educational and scientific value.

During the past two years the calls for aid from various counties have increased rapidly. The work handled during the past year has varied from small concrete culverts up to the Des Moines river bridges at Kilbourn and Cliffland, plans and specifications for which were prepared by the Commission, the supervision of the actual work being under inspectors reporting to the Commission.

Organization and History

The laws of the State of Iowa provide for a Board of Trustees, consisting of the Governor and the Superintendent of Public Instruction, both Ex-Officio, and for one member from each Congressional District, elected by the General Assembly. The Board of Trustees shall manage and control the Iowa State College at all times supporting the best interest of the institution.

The act establishing "A State Agricultural College and Model Farm" to be connected with the entire agricultural interests of the State was passed by the Legislature of Iowa in 1858. This legislature also appointed a board of commissioners to buy a farm and erect a college building, and elected a board of trustees to select a faculty and organize a college.

In 1859 a farm of six hundred and forty acres situated near Ames was purchased for the use of the college.

In 1862 a bill was passed by Congress, entitled, "An act donating public lands to the several States and Territories, which may provide colleges for the benefit of Agriculture and the Mechanic Arts."

The income of the College from National and State sources is therefore expended in instruction, experimentation and illustration in agriculture and in the mechanic arts, and in underlying and related science and literature.

All buildings are erected and all repairs thereon are made by the State of Iowa, the cost down to date being about \$1,250,000.

The College was formally opened on the 17th of March, 1869.

THE SCOPE.

The Iowa State College of Agriculture and Mechanic Arts seeks to aid the young men and women in the acquirement of a higher education. Instruction is given in the culture studies and sciences, together with such experimental work as to enable the students successfully to engage in a practical profession. Throughout the several courses, the study of the textbook is supplemented by lectures, discussions, library work, and the practical experimental work of the laboratory. The instruction is not merely theoretical but also practical—the student verifying and putting into practice in the laboratory the instruction received.

The Iowa State College offers four five year courses and fourteen four year courses leading to the following degrees:

FIVE YEAR COURSES.

Five year course in Mechanical Engineering, leading to the degree of Bachelor of Science (Mechanical Engineering), B. S. (M. E.).

Five year course in Civil Engineering, leading to the degree of Bachelor of Science (Civil Engineering), B. S. (C. E.).

Five year course in Electrical Engineering, leading to the degree of Bachelor of Science (Electrical Engineering), B. S. (E. E.).

Five year course in Mining Engineering, leading to the degree of Bachelor of Science (Mining Engineering), B. S. (E. M.).

FOUR YEAR COURSES.

Course in Agronomy, leading to the degree of Bachelor of Science (Agronomy), B. S. (Agn.).

Course in Dairying, leading to the degree of Bachelor of Science (Dairying), B. S. (Dairying).

Courses in Animal Husbandry, leading to the degree of Bachelor of Science (Animal Husbandry), B. S. (A. H.).

Course in Horticulture and Forestry, leading to the degree of Bachelor of Science (Horticulture and Forestry), B. S. (Hort. and For.).

Course in Agricultural Engineering, leading to the degree of Bachelor of Science (Agricultural Engineering), B. S. (A. E.).

Course in Science and Agriculture, leading to the degree of Bachelor of Science (Science and Agriculture), B. S. (Sci. and Agr.).

Course in Veterinary Medicine, leading to the degree of Doctor of Veterinary Medicine (D. V. M.).

Course in Mechanical Engineering, leading to the degree of Bachelor of Science (Mechanical Engineering), B. S. (M. E.).

Course in Civil Engineering, leading to the degree of Bachelor of Science (Civil Engineering), B. S. (C. E.).

Course in Electrical Engineering, leading to the degree of Bachelor of Science (Electrical Engineering), B. S. (E. E.).

Course in Mining Engineering, leading to the degree of Bachelor of Science (Mining Engineering), B. S. (E. M.).

Course in Ceramics, leading to the degree of Bachelor of Science (Ceramics), B. S. (Cer.).

Course in General Science, leading to the degree of Bachelor of Science (B. S.).

Course in Domestic Economy, leading to the degree of Bachelor of Science (Domestic Economy), B. S. (D. E.).

Two year courses are also offered in Mining Engineering and Clay Working, and a one year course in Poultry Husbandry, for the completion of which, certificates will be given. That many, who are unable to take the full college course, may take advantage of the advancement being made in their chosen work, a two weeks' short course is now offered each year during the winter vacation in Stock and Grain Judging and Dairying. A School of Good Road Investigations is also held during each summer vacation. The interest in all of these short courses is becoming greater, the attendance is increasing, and the benefits to be derived from them are constantly increasing.

LOCATION.

The College occupies a delightful and healthful location upon high rolling land in the west part of Ames, Story County. Situated at the junction of the north and south branch and the main double-track line of the Chicago & Northwestern Railroad and connected with all the trunk lines of Iowa, Ames is easily accessible from all parts of the State. An electric railway connects Ames and the College with efficient service. The Ft. Dodge, Des Moines & Southern Ry. (electric), with stations on the College Campus, gives excellent connections with Des Moines and Fort Dodge, and with all of the trunk lines.

Ames is a most desirable town for wholesome college influences. Its people are thrifty, enterprising and cordial. The town has an excellent system of public schools, numerous churches, water works, electric lights and a good city government. It is an inviting community for families who wish to educate their children, enjoy the better elements of society and an environment of reasonable expense. Ames and the College are on very cordial terms, and its citizens seek to promote the efforts of the students and the highest interest of the College.

THE COLLEGE GROUNDS.

Of the entire College domain of 1200 acres, 125 acres are set apart for College grounds. These include the experimental plots, the young forestry plantations, the surroundings of the professors' dwellings and the central campus with its beautiful winding walks and drives, its trees, shrubbery and flower gardens, and its large and stately college buildings. The true principles of landscape gardening have been so faithfully observed in the gardening and in the location of buildings and drives as to make the entire campus a large and beautiful park.

BUILDINGS.

Twenty-seven commodious buildings have been erected by the State for the exclusive use of the various departments of the College, besides the dwelling houses and buildings for farm stock, machinery and work. All of these buildings are heated by steam, lighted by electricity, and supplied with pure water.

Central Building: The new Central Building which has been erected on the site of the Old Main accommodates the Executive Offices, the departments of English, Civics, Modern Languages, Economic Science, History, Mathematics, Public Speaking, Botany and General Bacteriology. The building is of buff Bedford stone, built in the Roman Renaissance style, which style has also been adopted for the Engineering and new Agricultural Halls. The building completed and furnished cost about \$375,000.00.

Engineering Hall: The Engineering Departments occupy the new Engineering Hall. This is a fire-proof building in which all the engi-

neering departments have offices, recitation and lecture rooms, laboratories and engineering museum. It is of Bedford stone, has plate glass windows, and modern conveniences and furnishings throughout. This building, costing \$220,000.00, is the best engineering building west of the Mississippi river.

Engineering Annex: This is a two story fire-proof building, 50 feet by 208 feet, contract for which is let, the structure to be finished by September 1st, 1909. The total cost is \$30,000. The first story will be devoted to the use of the Electrical Engineering Department, the Mining Engineering Department and the Surveying Department. In it will be located the dynamo engineering laboratory, assaying and clay working rooms for the Mining Engineering Department, and instrument room and class room for the Surveying Department. The second story will contain additional rooms for the Mining Engineering Department, the remainder being given up to drafting rooms and class rooms for the Electrical Engineering Department and the Civil and Mechanical Engineering Departments.

Agricultural Hall: The new Agricultural Hall will be completed and fully equipped for use at the opening of the next college year, September 1, 1909.

The building is 234x78 feet, and four stories in height. It is fire-proof throughout and of the best modern construction, and will be arranged with suitable conveniences and facilities for thoroughly efficient high-grade work in agricultural instruction and investigation. This building, with its equipment complete, will cost about \$275,000.00.

Agricultural Annex: The assembly room of the new Agricultural Hall is semi-circular in form, the base being ninety-six feet in diameter. The annex is fire-proof throughout and of the best modern construction. This annex, with its equipment, will cost about \$75,000.

Agricultural Engineering Hall: This is a four story building, the lower stories of stone and the upper of brick. It contains recitation rooms of the divisions of Agriculture and Veterinary Science, offices of the Experiment Station and sewing rooms of the Domestic Economy department.

Agricultural Engineering Annex: This is a four story, fire-proof building, built of steel and pressed brick, costing when equipped about \$70,000.00. It accommodates the workshops, tool rooms, blacksmith shop, carpenter shop, drafting room, reading room, rooms for the study and exhibition of various farm implements, offices and class rooms, bulletin rooms and a photographic department.

Morrill Hall: Morrill Hall, one of the oldest of the College buildings, was named in honor of Hon. Justin S. Morrill, the originator of the "Land Grant" for Colleges of Agriculture and Mechanic Arts. It is of deep red brick with stone, brick and terra cotta trimmings. In it are the College Chapel, Library and Zoological Museum, lecture rooms and laboratories.

Margaret Hall: Margaret Hall, the home of the young women of the College, occupies one of the most pleasing locations on the campus. It is built of brick, roofed with slate, provided with steam heat, electric lights, baths and large parlor. The hall will accommodate about one hundred girls, to whom the rooms will be assigned in the order of their application. The privilege of rooming in Margaret Hall is reserved for regular students. In connection with the Hall there are two clubs at which the girls may obtain board at a reasonable rate. Young women residents of Margaret Hall are required to board in one of these clubs. The young women are under the direction of an efficient dean of women. The department of Domestic Economy is also located in this building.

Dairy Building: This is a three story building built of pressed brick, trimmed with Bedford stone, containing factory, butter and cheese rooms, bottling room, refrigerators, lunch room, offices, research laboratory, farm dairy room, students testing laboratory, lecture room, dairy reading room, and bacteriological laboratory for research and investigation.

Chemical Hall: A three story brick building furnished with steam heat, water, gas and laboratory equipment, accommodating 600 students in Chemistry.

New Machine Shop: This is an entirely new building, 150x45 feet, just erected. It is practically two stories high, and besides a large machine shop, surrounded by a gallery, it contains laboratory, locker room, office, class room and tool room. This building is one of the best college engineering shops in the country.

Station Barn: The Experiment Station barn is one of the best and most modern buildings of its kind to be found anywhere in the world. It is veneered with buff pressed brick, has a slate roof, paved brick floors, and is in every respect entirely fire proof. The building is devoted to the housing of beef and dairy cattle and horses, for storage of vehicles and machinery, storage and grinding room for feed, seed rooms for the drying of corn and the storage of grain and feed stuffs used in experimental work.

Judging Pavilion: In connection with the experimental barn is a two story octagonal judging pavilion. It is built of buff pressed brick with a slate roof. The lower story is used for stock judging, and the upper for grain judging. This building, thoroughly equipped in every way, is conceded to be the best building of its kind on the continent.

Horticultural Laboratory: This is a two story brick building connected with the greenhouse. The main floor, accommodating fifty students, is especially fitted for the study of fruits. The building is equipped with two refrigerators, one for experimental work in cold storage and the other for storing fruits for class purposes.

Greenhouses: The present plant contains 10,000 square feet under glass. The houses are of cypress construction, supported by a steel

structure. They are heated by steam, operated on the Paul system, with varying temperatures for the propagating house, growing houses, and seed testing houses. The houses also include four commodious work rooms used in potting, transplanting and other necessary work.

Structural and Hydraulic Laboratory: This is a three story stone and brick building, which has been entirely remodeled and rebuilt into a modern laboratory building, fire proof except the roof. The Hydraulic laboratory occupies a basement wing lined with enamelled brick, together with the floor above it. There are also three large structural laboratory rooms, four computing and research rooms, and five instrument rooms and offices. The surveying department occupies the top floor of this building temporarily.

Power Station: This is a one story brick building, 36x120, devoted to the lighting and pumping plants of the College, and to the heating plant for the engineering buildings. All of the equipment is used for purposes of instruction, as far as this does not interfere with its other uses. In this way quite extensive equipment for steam and gas engine laboratory work is made available. The building contains an engine and dynamo room, a boiler room and a pump room.

Foundry: This is a one story brick building, 38x78 feet, containing the equipment for instruction in foundry practice. The roof trusses are of steel and calculated to carry traveling cranes for transferring heavy castings and forgings.

New Forge Shop: This is a one story brick building, 38x78 feet, with a store room at one side in an addition. The building was constructed in 1906. It contains equipment for construction in forge shop practice. The roof trusses are of steel and the roof is of slate.

Pattern Shop: This is a one story brick building, 38x120 feet, devoted to the work of instruction in bench work, wood turning and pattern work. A fire proof room is provided for the storage of patterns.

Locomotive Laboratory: For the temporary protection of the locomotives donated to the Department of Mechanical Engineering by the Chicago & Northwestern railway and by the estate of S. H. Mallory, a corrugated iron structure has been provided.

Veterinary Hospital: This is a three story brick building, containing offices and dissecting rooms, and is well equipped for conducting clinical as well as general hospital work.

Horse Barns and Stock Pavilion: The barn, built of brick, with a slate roof, is for horses, the storage of grain and general farm purposes. The Stock Pavilion is also of brick, is circular in form, well heated and lighted, accommodates several hundred students at a time, and affords first class advantages for stock judging and animal husbandry.

Sanitary Hall: A two story brick building, containing offices, kitchen and dining room for the hospital patients, and rooms for the sick and convalescent.

Music Hall: This is a two story brick building, fitted up with apparatus and instruments for practice and instruction.

Central Heating Plant: A central heating and power plant furnishes heat and power for all College purposes with very satisfactory results in comfort, economy and cleanliness.

Dwelling Houses: There are also on the campus eighteen comfortable dwelling houses occupied by professors' families, and by foremen and employees.

Other Buildings: Stables, barns, sheep and swine and seed houses sufficient for the requirements of the farm, are conveniently grouped near the College campus.

Admission to the College

Methods of Admission.

Students are admitted upon the presentation of a certificate from schools or colleges, or by examination at the College.

Admission by Certificate.

The committee to determine the value of secondary school credits will hold regular meetings in order that the classification of new students may not be delayed.

All entrance credits must be on file not later than the second Monday in August or the first Monday in January.

Students entering the Freshman class by certificate from accredited high schools or colleges must present specific certificates showing amount and grade of work done and text-books used in the subjects required for entrance. Such certificate showing the successful completion of the amount of work required in the various subjects for entrance to the College will be accepted and the student admitted to the Freshman class without examination.

Superintendents and Principals are urged to send to the College immediately upon the close of the school year the Uniform Admission Certificate of each graduate intending to enter the College at the beginning of the ensuing College year. If on inspection the certificate is found satisfactory the applicant will be forwarded a certificate entitling him to admission without examination. Uniform Admission Certificates may be had by teachers and students upon application.

Graduates of schools fully accredited by other colleges which have as high a standard of entrance requirements as this institution will also be admitted as Freshmen upon presentation of certificates of graduation, accompanied with Uniform Admission Certificate.

College Credit for Work Done Elsewhere.

Graduate and under-graduate students of other colleges will be admitted and granted such credits as their work will justify. Work of recognized merit that has been taken at other colleges or universities of good rank and standing will be credited for an equivalent amount of work so far as it applies in any of the courses offered in this College. Credits allowed, may at the option of the heads of departments, be conditioned on satisfactory work during the student's first semester in college.

Adult Special Students are admitted in accordance with the provisions found under Special Students. See Index.

Admission by Examination.

Students desiring to enter by examination will be given such examinations upon any subject required for entrance upon presentation of satisfactory evidence of having devoted sufficient time in the preparation of such subjects.

Examinations for entrance to College will be conducted at the opening of each semester on the Tuesday and Wednesday preceding classification.

Entrance Examination Periods:

Tuesday.

- 8-10 A. M.—Public Speaking. Room 308, Central Building.
- 10-12 A. M.—English. Rooms 1 and 3, Central Building.
- 1-3 P. M.—Language. Room 119, Central Building.
- 3-5 P. M.—Botany. Room 312, Central Building.

Wednesday.

- 8-10 A. M.—Mathematics. Room 221, Central Building.
- 10-12 A. M.—History. Room 208, Central Building.
- 1-3 P. M.—Civics. Room 102, Central Building.
- 3-5 P. M.—Language. Room 119, Central Building.

The Freshman work will be of such grade that a graduate of an accredited school can reasonably be expected to be prepared to carry it creditably. All students are urged to review thoroughly at high school or elsewhere Algebra and English Grammar just before entering. Diplomas of graduation will not be accepted for entrance unless accompanied by certificates as stated above.

ENTRANCE REQUIREMENTS.

The requirements for admission are stated in terms of credits. The term credit means the equivalent of five forty- or fifty-minute recitations per week in a given subject for a term of eighteen weeks, adequate time being given to the preparation of each lesson.

Students desiring admission to the Freshman year must present thirty credits. Of these, certain are required and the balance elective, as stated below under requirements for admission to the several divisions of the College.

A. The following 17 credits are required of all entering the courses in Agriculture, Engineering and Science:

Mathematics,	Credits
Algebra	3
Geometry, plane	2
English	6

History	2
*Foreign Language.....	
German, French, Spanish or Latin..	4

B. Electives.

Agriculture, Elements of.....	1
Astronomy	1
Bookkeeping	1 or 2
Botany	1 or 2
Business Arithmetic	1 or 2
Chemistry	1 or 2
Civics	1 or 2
Commercial Geography	1
Drawing, freehand or perspective	1 or 2
English	1 or 2
Geology	1 or 2
German	2 or 4
Greek	2 or 4
History	2 or 4
Latin	2 or 4
Manual Training	1, 2 or 3
Mathematics	1 or 2
Mechanical Drawing	1, 2 or 3
Mental Arithmetic	1
Optional	2
Physics	2
Physical Geography	1 or 2
Physiology	1 or 2
Political Economy	1 or 2
Spanish	2 or 4
Stenography	1 or 2
Zoology	1 or 2

Limitations. Not more than four elective credits will be accepted in Foreign Language or any other one subject. No Foreign Language course of less than two credits will be accepted from students presenting only one foreign language.

Optional Subjects. An optional subject is any subject of the student's high school course not specified in the list of elective subjects.

*Students may be admitted without Foreign Language under the following conditions:

1. The student must offer all of the required credits except the four in Foreign Language, together with sufficient elective credits to make a total of thirty.

2. The language requirements must be made up before graduation. It will ordinarily require, if taken in College, extra work to the extent of five hours a week for one year. This extra work will not be credited as part of the credit hours required for graduation in the several courses. Opportunity for making up deficiencies in language will be offered by the College.

REQUIREMENTS FOR ADMISSION TO THE SEVERAL DIVISIONS OF THE COLLEGE.

Division of Agriculture.

Required Credits:

Algebra	3
Geometry, plane	2
English	6
History	2
*German, French, Spanish or Latin...	4
Science	1
	—
	18

Elective Credits:

The remainder of the thirty necessary credits must be made up by elections from B. Electives.

Division of Engineering.

Required Credits:

Algebra	3
Geometry, plane	2
Geometry, solid	1
English	6
History	2
*German, French, Spanish or Latin...	4
	—
	18

Elective Credits:

The remainder of the necessary credits must be made up by elections taken from B. Electives.

Division of Science.

Required Credits:

Algebra	3
Geometry, plane	2
Science	1
English	6
History	2
*German, French, Spanish or Latin...	4
	—
	18

*See Notes 1 and 2 under Entrance Requirements, page 123.

Elective Credits:

The remainder of the necessary credits must be made up from elections taken from B. Electives.

ACADEMIC CLASSES.

For the accommodation of graduates from the smaller high schools of the state which offer only three years of work, and for other students who have had equivalent preparation elsewhere, this institution offers instruction in Academic classes in certain of the studies mentioned under (A) required credits, and also in certain elective credits. These subjects are here listed with a statement of the registered number of the course, the hours, and the semester in which the same are offered:

COURSE	NAME OF SUBJECT	HOURS CREDIT	SEMESTER TAUGHT	LEADING TO COURSE IN
Botany 1.....	Elementary Botany...	2	First.....	Agricultural
Civics 1.....	Government in State and Nation.....	2	First.....	Civil Engineering and Science
Civil Engineer ing 2.....	Field Work.....	1	First.....	Civil Engineering
Civil Engineer- ing 1.....	Lettering.....	1	Second First and	Civil Engineering
English 1.....	Grammar.....	5	Second ..	For Academic Admission
English 2.....	Rhetoric and Compo- sition.....	5	First and Second ..	All Four Year Courses
History 1.....	English History.....	5	First.....	For Academic Admission
History 2.....	Advanced American ..	4	First and Second ..	Science
History 16....	National Period.....	3	First and Second ..	Agricultural and Engineering
Language 1....	French	5	First.....	All Four Year Courses
Language 2....	French	5	Second	All Four Year Courses
Language 5....	German	5	First.....	All Four Year Courses
Language 6....	German	5	Second	All Four Year Courses
Language 30....	Spanish.....	5	First.....	All Four Year Courses
Language 31....	Spanish.....	5	Second	All Four Year Courses
Literature 12..	English Classics.....	4	Second First and	Agricultural and Engineering
Mathematics 1.	Algebra	5	Second ..	For Academic Admission
Mathematics 2.	Algebra	5	First.....	All Four Year Courses
Mathematics 3.	Algebra Review.....	5	First and Second ..	All Four Year Courses
Mathematics 5.	Plane Geometry.....	5	Second	All Four Year Courses
Mathematics 6.	Solid Geometry	3	Second	Engineering
Mechanical Engineering 19	Freehand Drawing....	1	First.....	{ Mechanical Engineering { Electrical Engineering
Mechanical Engineering 29	Manual Training.....	1	Second	{ Mechanical Engineering { Electrical Engineering
Mining Engineering 20	Elements of Mining...	1	First.....	Mining Engineering
Mining Engineering 21	Elements of Mining...	1	Second	Mining Engineering
Public Speak- ing 2.....	Declamation	2	First and Second ..	Agricultural

The College Registrar shall have authority to determine the value of preparatory credits submitted, and notify applicants of assignment in course. Such assignments will be conditioned on the students doing creditable work.

Any student who at entrance presents satisfactory credit for part of the Academic course, or who by examination passes part of it satisfactorily, will be classified in such of the remaining work offered in the Academic year as the Dean of the Junior College and the Dean of the Division in which the student is enrolled shall consider will best prepare him for his college course. After providing in such classification for the remainder of the 30 credits required for entrance to college, the student may complete his schedule by taking up some of the Freshman studies.

Completion of the Academic work will not entitle the student to enter the Freshman class unless he presents the 30 semester credits regularly required for entrance, as already stated, not more than $7\frac{1}{2}$ such credits being allowed for any year of the work of a secondary school. Inasmuch as the high school period is from forty-five to fifty minutes and the college period sixty minutes, the Academic course will be counted as $7\frac{1}{2}$ credits.

Opportunity will be offered during the four weeks winter vacation whereby students deficient in Mathematics, English, or Modern Language, can take up some work in these lines under private tutors.

ENTERING IN JANUARY.

Students may enter the State College in the academic course, at the opening of the second semester, in January as advantageously as in the fall. Many students find it desirable to begin their studies in College in the second semester. Those who have had no considerable algebra in the preparatory school should review its fundamental principles and become acquainted with its application in the wider and more difficult field of college work, and those who have had experience in plane geometry can, to advantage, supplement such study by a review of some standard text and a thorough drill in original geometric propositions. The classes established at the beginning of the spring semester furnish an excellent opportunity for students to prepare themselves thoroughly for entering upon collegiate work at the opening of the next college year.

SPECIAL STUDENTS.

Students taking special work in any of the college courses must be at least twenty years of age, must give good and satisfactory reasons for desiring such classification and must furnish satisfactory evidence that they are thoroughly prepared to pursue the work chosen. Permission to take such special course and the subjects included therein must receive the approval of the President of the College and the Dean or Head of the Department in which the student seeks enrollment.

(1) Permission to take special course will not be granted to students until they have completed the freshman year of some one of the courses offered, and then not to exceed a period of two years, except on the recommendation of the Faculty of the division in which the student is enrolled and on approval of the President of the College.

(2) All special students shall pay additional fees for special work of ten dollars for each semester.

Special and Short Course students are subject to the same rules governing conditions on back work that apply to all other students. Students wishing to change from a regular to a special or short course either in the same or another department will be required to remove all conditions on back work. Special students, as well as regular students, are subject to the conditions given under "Entrance."

It is the theory of special classification that students should be particularly strong and well prepared to do thorough work in the studies they elect. A high standard of scholarship will, therefore, be required of all who are thus classified.

SHORT COURSE STUDENTS.

Worthy students of good standing, over twenty years of age, not prepared to meet the entrance requirements of the Freshman year, may be admitted as short course students not exceeding two years without examination, provided they give evidence of satisfactory preparation to carry such work successfully.

Short Course students who have not had previous work of collegiate grade will be required to take the first year of their work from Junior College studies.* During the second year they may be admitted to the Senior College studies in accordance with the rules governing admission to each study or course.**

FEES AND EXPENSES.

The entire expenses of a student need not exceed \$300.00 per College year.

Tuition.—No charge for tuition is made to the students from the state of Iowa. To the non-residents, a tuition fee of \$50.00 per year is charged.

Janitor Fee.—The regular janitor and incidental fee for the semester is \$10.00, but all students who classify during the classification period, Thursday, Friday, and Saturday before College work begins, will be charged a janitor fee of only \$8.00 per semester.

Laboratory Fees.—Laboratory fees at the actual cost of breakage and usage are charged to the students, the Treasurer's receipt for such fee being required before the students are admitted to laboratories. For the amount of such fees see department descriptive courses.

Board and Room.—About one hundred young women can secure rooms in Margaret Hall. The privilege of rooming in this building is

*Special Interpretation for Agricultural Students.—An exception to this rule will be made in case of Animal Husbandry 11 and 12, which may be taken the first year in lieu of Animal Husbandry 2 and 3, which cannot be taken until the work in Animal Husbandry 1 and 2 has been completed.

**For conditions of admission to any course, see the description of the course of study.

reserved for regular students. Students rooming in this building furnish their own bedding and all furniture except bedsteads, dressers, and tables. Each girl pays \$9.00 per semester for room and a sum not exceeding 55 cents per week for lighting, heating and incidentals.

All other students can secure furnished rooms and board in clubs or private families adjacent to the College grounds at from \$3.50 to \$4.50 per week.

The College Custodian, office in old office building, should be consulted by all new students concerning rooms and rooming places, that undesirable rooms and houses may be avoided. The College authorities reserve the right to forbid students rooming in any particular house for sanitary or any other reasons.

No group of young women students may establish a "house" or "home" without the full knowledge and approval of the President and the Dean of Women, nor make any definite plans in such direction. No young woman may become a resident of a sorority house until after she is an initiated member of the sorority.

The young women residents of Margaret Hall are required to board in one of the Margaret Hall boarding clubs.

Hospital Fee.—All students living in College buildings, and such others as desire to, pay a Hospital fee of \$2.50 per semester. (See College Hospital).

Diploma Fee.—A diploma fee of \$5.00 is payable before graduation.

Text Books.—All text books and stationery may be purchased at the College Book Store at about twenty per cent below the average retail price.

As security for the payment of bills, all students living in College buildings are required to deposit \$10.00 with the Treasurer, which deposit will be returned at the final settlement at the close of the semester. All the bills for each month must be settled at the Treasurer's office by the second Saturday of the next month.

ENTRANCE.

The office will be open for registration at 8:00 A. M. on the Thursday preceding the opening of each semester. All students are required to register as soon as possible.

Students who are required to take the entrance examination will be examined here the Tuesday and Wednesday preceding classification days.

After passing the examinations, the examination card should be taken to the classifying committee who give a card of classification which admits to college and assigns to class work. The student's name is at once entered upon the official list and will be included in the roll call of the following day. Attendance is expected thereafter at every recitation of the semester.

CLASSIFICATION AND STANDINGS.

Junior and Senior College.—The students are now classified in "Junior and Senior Colleges." The Junior College is composed of all students in the Academic, Freshman and Sophomore years: the Senior College, of all in the Junior and Senior years.

Amount of Work.—The amount of work in each course is expressed in hours, *an hour* meaning one recitation or its equivalent per week throughout the semester. It is considered that one hour's recitation or lecture will require as much time in the preparation, and hence is equivalent and receives an equal credit with a three hour laboratory.

Number of Hours.—No student shall be allowed to classify in more hours than are specified in the catalogue for the semester of the course taken unless he has an exceptionally high record in his previous college work. The taking of such additional work is subject to the approval by the Dean under whom the student is classified and the Head of the Departments in which the student is classified.

In general, students failing in any portion of a term's work will not be allowed to take full classification for the next semester.

Classification.—No student shall be admitted to or dropped from any class except by authority of the Classifying Officer.

Conflicts.—Students shall not classify in conflicting studies without the approval of the Classifying Officer and Heads of the Departments in which the student wishes to enroll.

Standing.—All the standings are based on the scale of 100. The passing grade is 75. A student receiving between 60 and 74 per cent inclusive in any course is conditioned and allowed to make up the condition under the direction of the head of the department. A student receiving below 60 per cent in any course is not passed in that course.

Back Studies.—Students shall be classified in back studies in all cases in which such studies are taught, subject to the first rule under Number of Hours. Any exception to this rule must be for good and sufficient reason, approved by the President of the College and the Dean or Head of the Department in which the student is enrolled.

No student shall be considered a candidate for graduation who has not at the beginning of the second semester of the Senior year completed his work to within the maximum number of hours regularly allowed in his course for that semester. If the uncompleted work is not offered in the second semester it shall be passed and reported to the recorder not later than April 1st.

EXAMINATIONS.

Examinations for back work for matriculated students will be conducted at the opening of each semester, on the Tuesday and Wednesday preceding classification days.

TUESDAY.

8-10 A. M.—Farm Crops.....	Farm Crops Lecture Room, Ag. Hall
8-10 A. M.—Mining Engineering.....	Room 306, Engineering Hall
8-10 A. M.—Zoology.....	Zoological Lecture Room
10-12 A. M.—English.....	Rooms 1 and 3, Central Building
10-12 A. M.—Civil Engineering.....	Room 312, Engineering Hall
1- 3 P. M.—Mech. Engineering.....	Rooms 204 and 205, Eng. Hall
2- 4 P. M.—History.....	Room 208, Central Building
3- 5 P. M.—Public Speaking.....	Room 308, Central Building
3- 5 P. M.—Electrical Engineering.....	Room 207, Eng. Hall

WEDNESDAY.

8-10 A. M.—Horticulture.....	Hort. Lecture Room, Ag. Hall
8-10 A. M.—Chemistry.....	Room 29, Chemical Hall
8-10 A. M.—Mathematics.....	Room 221, Central Building
8-10 A. M.—Animal Husbandry.....	An. H. Lecture Room, Agr. Hall
10-12 A. M.—Economics.....	Room 222, Central Building
10-12 A. M.—Dairying.....	Dairy Building
10-12 A. M.—Botany.....	Room 312, Central Building
1- 3 P. M.—Civics.....	Room 102, Central Building
1- 3 P. M.—Mech. Engineering.....	Rooms 204 and 205, Eng. Hall
1- 3 P. M.—Domestic Economy.....	History of Art Room
2- 4 P. M.—Modern Language.....	Room 119, Central Building
2- 4 P. M.—Agricultural Eng.....	Agr. Eng. Lecture Room, Agr. Hall
3- 5 P. M.—Soils.....	Soils Lecture Room, Agr. Hall
3- 5 P. M.—Physics.....	Room 207, Eng. Hall

DEPARTMENTS MAINTAINED.

Agricultural Chemistry,	History,
Agricultural Engineering,	Horticulture,
Agronomy,	Literature and Rhetoric,
Animal Husbandry,	Mathematics,
Botany and General Bacteriology,	Mechanical Engineering,
Chemistry, General and Applied,	Military Science,
Civics,	Mining Engineering,
Civil Engineering,	Music,
Dairying,	Modern Languages,
Domestic Economy,	Physics,
Economic Science,	Psychology and Ethics,
Electrical Engineering,	Public Speaking,
English,	Science and Agriculture,
Farm Crops,	Soils,
Forestry,	Veterinary Science,
Geology,	Zoology.

GOVERNMENT.

The relations of our College buildings, and the nature of the exercises, complicated as they are, by laboratory work, shop practice and labor, make order, punctuality and systematic effort indispensable. The

institution, therefore, offers no inducement to the idler or the self-indulgent. All who are too independent to submit to needful authority, too reckless to accept wholesome restraint or too careless to take advantage of their opportunities, are not advised to come. The discipline of the College is confined mainly to sending away those who prove, on fair trial, to be of this class.

MANUAL LABOR.

The following regulations in regard to manual labor have been adopted by the Board of Trustees:

1. The manual labor of students is divided into two kinds, viz.: Uninstructive labor, which shall be paid for in money, and instructive labor, which shall be compensated by the instruction given and the skill acquired.

2. Uninstructive labor shall comprise all the operations in the workshop, the garden, upon the farm and elsewhere, in which the work done accrues to the benefit of the College, and not to that of the student. Instructive labor shall embrace all those operations in the workshop, museum, laboratories, veterinary hospital, experimental kitchen, upon the farm, garden and experimental stations, in which the sole purpose is the acquisition of knowledge and skill.

3. Students shall engage in instructive labor in the presence and under the instruction of the professor in charge, according to the statement made in each of the courses of study.

The compensated labor furnished by the Divisions of Agriculture, Veterinary Medicine and of Engineering, is given by each to its own students and is eagerly sought. The "details" of compensated labor supplied by the needs of the various departments are given to the most faithful and meritorious students in each department. Uninstructive labor is paid for according to its value to the College, but no student should expect to pay the main part of his expenses by labor while here. The College cannot furnish the work, and even if it could, the student's time is *chiefly needed for study*. Still, many worthy and industrious students pay a considerable part of their expenses by labor, over \$4,000 being paid out by the College thus each year to students and post-graduate assistants.

GRADUATING THESIS.

All candidates for graduation in the Engineering and Agricultural courses are expected to present a satisfactory thesis.

The subjects for theses shall be selected under the direction of the professor in whose department they are written, and submitted to the Thesis Committee, with signed approval of the professor, on or before the first Monday in October.

It is expected that each thesis shall represent an amount of work equivalent to at least one exercise per week through the Senior year; that it shall show the result of the student's personal study or investi-

gation and be throughout original in matter and treatment so far as the nature of the subject will permit; that it shall be prepared under the supervision of the professor in charge, the student making frequent reports of progress and having an outline of matter ready for approval by the first week of the last semester.

The complete thesis shall be submitted to the Thesis Committee on or before May 25th.

POST GRADUATE COURSES.

The faculty of this College offers the degree of Master of Scientific Agriculture (M. S. A.) to Bachelors of Scientific Agriculture who are graduates of this College or others offering equivalent courses of study, the degree of Master of Science (M. S.) to Bachelors of Science who are graduates of this College or other colleges offering equivalent courses of study, the degree of Master of Agricultural Engineering (M. A. E.) to Bachelors of Agricultural Engineering who are graduates of this college or other colleges offering equivalent courses of study, and also Professional degrees in Engineering.

MASTER'S DEGREE.

The opportunity for resident study after graduation is a privilege granted only upon the recommendation of the President with the advice and consent of the Committee on Post-Graduate Study and the professors in charge of the departments in which the studies are to be pursued.

The candidate shall spend at least one academic year in residence. If only one year is spent in residence, the candidate shall devote his entire time to his post-graduate studies, except in cases where work previously done *in absentia* is accepted at the beginning of the students' residence by the Professor in charge of the major subject; such *in absentia* work shall constitute not more than one-half of the required work. In the case of graduates of this college, temporary leave of absence may be granted during the year's residence for special study elsewhere. In order to be entitled to his degree, the candidate must meet within four years the requirements existing at the time of matriculation, otherwise he must complete any additional requirements which may be in force at the time of his final examination.

Two lines of work shall be selected, designated as major and minor studies, the former to be given two-thirds and the latter one-third of the time. The major study shall be research work, the results of which shall be incorporated in a thesis.

The major and minor studies shall be so selected as to support and strengthen each other.

No under-graduate study shall be selected as a major study. Under-graduate studies may be taken for part of the minor work only with the approval of the Committee on Post-Graduate Study, and the heads of the departments in which the work is to be done.

The candidate shall have a reading knowledge of French or German.

Application for graduate study, specifying the departments in which the major and minor subjects are to be taken, shall be filed with the President within four weeks of the beginning of the first term's resident work, which, in all cases, shall be not later than October 1st, next preceding the commencement at which the degree is to be granted.

A detailed outline of the work to be done in the major and minor subjects approved by the heads of the departments in which the work is to be taken shall be filed with the Committee on Post-Graduate Study, within eight weeks of the opening of the semester in which resident work is begun.

The candidate for the master's degree shall apply in writing for examinations not later than May 1st, and such examinations shall be given not later than May 15th.

Graduates of other institutions desiring to become candidates for post-graduate degrees in this institution shall be required to show to the Committee on Post-Graduate Study evidence of under-graduate work equivalent to the corresponding course in this institution, and if any deficiency appears in the subjects elected for post-graduate work, to make up such deficiency.

Candidates for advanced degrees are expected to appear on the Commencement stage to receive such degrees.

PROFESSIONAL DEGREES IN ENGINEERING.

The several departments of the Division of Engineering confer the following professional degrees: In Mechanical Engineering, the degree of Mechanical Engineer, (M. E.); in Civil Engineering, the degree of Civil Engineer, (C. E.); In Electrical Engineering, the degree of Electrical Engineer, (E. E.); In Mining Engineering, the degree of Mining Engineer, (E. M.).

Applications for professional engineering degrees will be received from graduates of the engineering departments of this College or from other colleges offering equivalent courses of study in engineering.

A graduate of any of the four year engineering courses, to be entitled to the professional degree, shall have devoted not less than one year to resident study along lines satisfactory to the engineering faculty, shall have been engaged for not less than one year in a responsible professional position, and shall present a satisfactory thesis, or he shall have been engaged for not less than five years in a responsible professional position and shall present a satisfactory thesis.

A graduate of any of the five year engineering courses shall have devoted not less than one year to successful professional work and shall present a satisfactory thesis.

In this connection a responsible professional position means practical engineering experience, requiring the exercise of skill or executive ability in designing or construction work. References or personal knowledge of the facts will be required by the engineering faculty.

Further information as to the lines of work open to graduate students can be found under the courses of study described elsewhere.

COLLEGE HOSPITAL.

The actual sanitary condition of the College is excellent. The buildings are situated on high ground with good natural drainage. The water supply is exceptionally pure and abundant. The sewer system and sewerage disposal plant are the best that modern sanitary engineering can devise. Nevertheless in this, as in other like institutions, whose students are drawn from a wide territory, various diseases are brought here by the students themselves. In order to control epidemics and properly care for other cases of illness or injury, two hospitals are provided. These hospitals are under the charge of the College Physician, assisted by a professional nurse, a competent house-keeper, and a student hospital steward.

The expenses of the hospitals are defrayed from a fund accruing from the hospital fees paid by students.

A hospital fee of \$2.50 per semester is required of all students living in College buildings.

The privileges of the hospitals are also extended to students not coming in the College buildings, provided, 1st, that the physician shall be paid for calls at their residences, and 2nd, that the usual hospital fee shall be paid within the first ten days of the student's arrival.

Students not making the hospital deposit will be admitted to the hospital upon the basis of \$10.00 per week, within the discretion of the college physician.

The hospital fee insures to the payer thereof, medical attendance, nursing and medicine in illness or accident, and consultation and medicine for minor ailments in accordance with the regulations herein published.

The charges named are based upon the probable actual cost of medical attendance and hospital service, and the fund created is carefully devoted to these purposes. The College can not assume any liability beyond the extent of the fund so created. The hospital has proved to be a great blessing to the students.

The following regulations apply to the privileges of the hospital:

1st. Students entering the hospital shall be charged \$3.00 per week for board, room, light and heat. But for any time in excess of three consecutive weeks per term spent in the hospital an additional charge above that mentioned shall be made of \$4.00 per week.

2nd. In case a special nurse or physician is employed, the expense shall be borne by the particular patient, the selection of such nurse or physician to be approved by the College physician.

3rd. The College assumes no responsibility whatever nor shall the privileges of the hospital be extended to cases of smallpox.

4th. The President and College physician may require of students entering the college a certificate of a reputable physician showing successful vaccination.

5th. The College physician is authorized to exclude from the College dormitories and recitation rooms any person afflicted with a contagious disease.

COLLEGE LIBRARY.

The College Library, consisting of over 25,000 volumes and about 8,000 pamphlets, is chiefly a library of reference, containing standard and technical works bearing particularly upon the lines of study pursued in the College. Magazines, periodical literature bearing upon the special work of the students, and daily papers are furnished for the use of the students. The reading room of the library is open thirteen hours daily except Sunday, when it is open four hours. Personal assistance will be given by the librarian, and assistant to any who desire help in reference work.

This year the College received by bequest about 1500 volumes pertaining to Engineering and Economics from the library of the late Geo. W. Catt. This Engineering Library with that section of books from the general collection has been made a Departmental Library located in Engineering Hall.

RELIGIOUS LIFE AT THE COLLEGE.

Although a state school, and hence non-sectarian, the College life is dominated by religious influences.

The Young Men's and Young Women's Christian Associations, Bible Study Classes, and Mission Classes, consisting of members from both faculty and student body have a helpful influence not only upon the religious but upon the social life of the College. The members of the Associations assist in the reception of the new students and in the maintenance of religious work.

The work of each Association is under the direction of a general secretary. These two Associations are now located in their new home, "Alumni Hall," which was constructed at an expense of \$60,000.00 by funds donated by the Alumni, students, instructors, citizens and friends. This home is the center of the religious and social life of the College and as a building for such purposes it is not excelled in the West.

The faculty and students assemble daily in the Chapel at 9:40 A. M. for public worship. On each Sunday morning at 10:45, Chapel exercises are conducted by some prominent clergyman invited for the occasion. In all these services, the object is to emphasize and enforce the principles of morality and of the Christian religion.

There are nine different denominational churches in Ames, all of which are closely in touch with and cordially invite the students to coöperate with them in all of their religious services.

ALUMNI ASSOCIATION.

The Alumni Association of the Iowa State College was organized in 1876. Its purpose is to promote the highest interest of the institution and to increase the friendship and sympathy among the students and alumni.

The present officers of the association are: E. W. Stanton, '72, Honorary President; C. N. Dietz, '72, President; Mrs. Norma Hainer Beech, '87, Secretary; Mrs. Julia Wentch Stanton, Treasurer; and Mrs. Mary McDonald Knapp, '83, Historian. The annual business meeting and banquet are held on Wednesday and Thursday of Commencement Week. A local association was organized in April, 1903, in order to arrange for the annual meetings and to keep the alumni in close touch with one another. Branch associations have been organized in Des Moines, Washington, D. C., New York, Pittsburg, Chicago, Philadelphia, Schenectady and St. Louis.

The Alumni Hall adds much to the association, as it affords a place where all alumni can meet when visiting their Alma Mater. —

COLLEGE PUBLICATIONS.

1. Catalogue, published in February, and giving general information about the College and its several departments.
2. College Compendium, an illustrated catalogue of the school.
3. Special announcements of the Agricultural, Veterinary and Engineering divisions, and of the Short Course and Good Roads School, one bulletin being published each month.
4. Bulletins recording the results of experimental studies carried on by the Agricultural and Engineering Experiment Stations.

STUDENT AND ALUMNI PUBLICATIONS.

1. The Student, a weekly paper, published by a staff elected from the student body and devoted to the recording of such matters as pertain to the interest and welfare of the school.
2. The Bomb, an annual published by the Junior Class.
3. Iowa Agriculturist, published monthly by the Agricultural Club of the Iowa State College.
4. Iowa Engineer, published bi-monthly by the Engineering Association.
5. The Alumnus, a monthly publication, devoted to and published by the Alumni Association.

LITERARY SOCIETIES.

The work of the nine literary societies serves not only to supplement the social and literary work of the College, but also aids the student in securing that training so necessary to enable one to appear before an audience, the training which every student needs and which cannot be secured in the class room alone. It is the purpose of the officers of the College to keep each Friday evening open that the work of these societies may go on without interruption. Every student is invited and urged to join one of these societies.

DEBATING LEAGUE.

The Debating League is an organization composed of the Bachelor, Crescent, Phileleutheroi, Philomathian, Pythian, Welch and Forum literary societies. Its function is to arrange for and carry out debates, both inter-society and inter-collegiate. There is an inter-society debate each semester, calling out four students from each society. Of these four students, two maintain the affirmative and two the negative, of the same proposition on the same night against opposing teams from other societies. During the year the inter-society contests give opportunity for forty-eight students to engage in vigorous debate and many others get practice in trying to win a place on their society teams. During the fall semester a debate is held with the Iowa State Normal School. Hereafter we will support a dual debate, thus calling out six debaters from each school. The triangular inter-collegiate debate with Drake University and Iowa College held during the spring semester also calls for six students to represent the Iowa State College. The debates arouse great interest, and to the participants, they bring great profit.

ORATORICAL ASSOCIATION.

The Oratorical Association is composed of three members from each of the literary societies and three from the faculty. This association, by providing for joint public programs, declamatory and oratorical contests, and society graduation, helps to increase the interest in the general literary work of the school.

Inter-society oratorical contests are held each fall semester and declamatory contests each spring semester, each society having one representative. The winner in the inter-society oratorical contest represents the College in the annual inter-collegiate contest in which Drake, Penn, Parsons, Upper Iowa University, Cornell, Des Moines, Coe, Lenox, Leander Clark, Tabor, Central University, Buena Vista College and Iowa State College are represented.

MUSICAL ORGANIZATIONS.

The College maintains a Choral Society, membership being open to students and citizens of Ames, a College Choir, a Male Glee Club, and a Ladies Glee Club, all of which give frequent concerts and recitals. The musical organizations are under the supervision of the Director of Music.

A College Band of thirty-two pieces is maintained under the instruction of Charles L. Mundhenk, a member of the Iowa State Band of 1893. This band furnishes music in connection with the Military Department and also for all athletic and student assemblies.

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Iowa State College

of Agriculture and Mechanic Arts

LIBRARY
OF THE
UNIVERSITY OF IOWA



DIVISION OF AGRICULTURE
1910 - 1911

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

IOWA STATE COLLEGE

OF

AGRICULTURE and
MECHANIC ARTS



DIVISION OF AGRICULTURE
MARCH, 1910
AMES, IOWA

Published Monthly by the Iowa State College of Agriculture and Mechanic Arts. Entered as Second-class Matter October 26, 1905, at the Post Office at Ames, Iowa, under the Act of Congress of July 16, 1904. : :

Calendar

1910-1911.

FIRST SEMESTER.

August 30-31, Tuesday and Wednesday	Entrance Examinations.
September 1, Thursday, 1:30 P. M.	First Semester begins.
September 1-3, Thursday, 1:30 P. M., to Saturday, 5:00 P. M.	Registration-Classification Days.
September 5, Monday, 7:40 A. M.	College Work begins.
September 10, Saturday, 8:00 P. M.	Y. M. C. A. and Y. W. C. A. Reception.
October 1, Saturday, 8:00 P. M.	Junior Trot.
October 3, Monday.	Last Date of Presentation of Subjects for Bachelor's Degree.
October 15, Saturday, 8:00 P. M.	Sophomore-Freshman Annual.
November 24-26, Thursday to Saturday	Thanksgiving Vacation.
December 20-21, Tuesday and Wednesday	Semester Examinations.
December 21, Wednesday, 5:00 P. M.	College Work closes.

1910-1911.

January 2-14, Monday to Saturday	Special Short Courses in Agriculture and Domestic Economy.
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1910-1911.

SECOND SEMESTER.

January 17-18, Tuesday and Wednesday	Entrance Examinations.
January 19-21, Thursday, 1:30 P. M., to Saturday, 5:00 P. M.	Registration-Classification Days.
June 8, Thursday	Second Semester closes.

State Board of Education of Iowa

MEMBERS.

HON. J. H. TREWIN, President.....	Cedar Rapids
HON. A. B. FUNK.....	Spirit Lake
HON. GEO. T. BAKER.....	Davenport
HON. T. D. FOSTER.....	Ottumwa
HON. ROGER LEAVITT.....	Cedar Falls
HON. D. D. MURPHY.....	Elkader
HON. CHAS. R. BRENTON.....	Dallas Center
HON. P. K. HOLBROOK.....	Onawa
HON. EDW. P. SCHOENTGEN.....	Council Bluffs

FINANCE COMMITTEE.

HON. W. R. BOYD, President.....	Cedar Rapids
HON. THOMAS LAMBERT.....	Sabula
HON. D. A. EMERY, Secretary.....	Ottumwa

Officers of Instruction

THE FACULTY.

- ALBERT BOYNTON STORMS. *1903...President, Dean of the Division
of Science
B. A., Michigan, 1884; A. M., 1893; D. D., Lawrence, 1899; LL. D.,
Drake, 1903.
- EDGAR WILLIAMS STANTON. 1877, 1874...Dean of Junior College,
Professor of Mathematics
B. Sc., Iowa State College, 1872; M. Sc., 1887; LL. D., Coe, 1904.
- CHARLES FRANKLIN CURTISS. 1897, 1891...Dean of the Division of
Agriculture, Director of Experiment Station
B. S. A., Iowa State College, 1887; M. S. A., Iowa State College,
1892; D. Sc. in Agriculture, Michigan Agricultural College, 1907.
- ANSON MARSTON. 1892...Dean of Division of Engineering, Professor
of Civil Engineering
B. C. E., Cornell University, 1889.
- CHARLES HENRY STANGE. 1909...Dean of the Division of Veterinary
Medicine, Professor of Theory and
Practice and Therapeutics, 1909
D. V. M., Iowa State College, 1907.
- HONORABLE JAMES WILSON. 1902, 1891...Lecturer in Agriculture
M. S. A., Iowa State College, 1907.
- GENERAL JAMES RUSH LINCOLN. 1884, 1883...Professor of Military
Science
- ALFRED ALLEN BENNETT. 1885.....Professor of Chemistry
B. Sc., Michigan, 1877; M. Sc., Iowa State College, 1888.
- HERMAN KNAPP. 1887, 1883.....Registrar
B. S. A., Iowa State College, 1883.
- LOUIS HERMANN PAMMEL. 1889.....Professor of Botany
B. Agr., Wisconsin, 1885; M. S., 1889; Ph. D., Washington, St.
Louis, 1898.

*First date after the name indicates date of appointment to present position, the second date, when the first fails to do so, indicates the date of first appointment in the College.

- LOUIS BEVIER SPINNEY. 1897, 1891.....Professor of Physics and
Illuminating Engineering
B. M. E., Iowa State College, 1892; B. S. (E. E.), 1893.
- SAMUEL WALKER BEYER. 1898, 1891..Vice Dean of Division of
Engineering, Professor of Geology and
Mining Engineering.
B. S., Iowa State College, 1889; Ph. D., Johns Hopkins, 1895.
- ALVIN BUELL NOBLE. 1898....Professor of Rhetoric and Literature
B. Ph., University of Iowa, 1887.
- HENRY ELIJAH SUMMERS. 1898.....Professor of Zoology
B. S., Cornell University, 1886.
- ORANGE HOWARD CESSNA. 1900.....Professor of History and
Psychology
B. S., Iowa State College, 1872; B. D., Garrett Biblical Institute,
1885; D. D., 1900; A. M., Cornell College, 1901.
- WILLARD JOHN KENNEDY. 1901...Professor of Animal Husbandry
B. S. A., Iowa State College, 1899.
- WILLIAM HENRY STEVENSON. 1903, 1902.....Professor of Soils
A. B., Illinois College, 1893; B. S. A., Iowa State College, 1905.
- SPENCER AMBROSE BEACH. 1905....Vice Dean of the Division of
Agriculture, Professor of Horticulture
B. S. A., Iowa State College, 1887; M. S., Iowa State College, 1892.
- BENJAMIN HORACE HIBBARD. 1906, 1902..Professor of Economic
and Political Science
B. S. A., Iowa State College, 1898; Ph. D., Wisconsin, 1902.
- WARREN H. MEEKER. 1907, 1891.....Professor of Mechanical
Engineering
M. E., Cornell University, 1891.
- FRED ALAN FISH. 1907, 1905....Professor of Electrical Engineering
M. E. in E. E., Wisconsin, 1904.
- JAY BROWNLEE DAVIDSON. 1907, 1905..Professor of Agricultural
Engineering
B. S., M. E., Nebraska, 1904.
- MRS. ALICE DYNES FEULING. 1907..Professor of Domestic Economy
B. S., Chicago, 1900.
- ARTHUR MACMURRAY. 1908.....Professor of Public Speaking
A. B., Kansas, 1896; M. O., Ott School of Expression, Chicago, 1904.
- ROBERT EARLE BUCHANAN. 1909, 1904..Professor of Bacteriology
B. S., Iowa State College, 1904; M. S., Iowa State College, 1906;
Ph. D., Chicago, 1908.

- RALPH R. DYKSTRA. 1909, 1905..Professor of Anatomy and Obstetrics
D. V. M., Iowa State College, 1905.
- FLETCHER BRIGGS. 1909.....Professor of Modern Languages
Ph. B., Iowa, 1901; M. A., 1902.
- HAROLD DE MOTT HUGHES. 1910.....Professor of Farm Crops
B. S., University of Illinois, 1907; M. S. A., University of
Missouri, 1908.
- MARIA M. ROBERTS. 1904, 1891.....Vice Dean of Junior College,
Associate Professor of Mathematics
B. L., Iowa State College, 1890.
- ARTHUR THOMAS ERWIN. 1904, 1900.....Associate Professor of
Horticulture
B. S., Arkansas, 1899; M. S. A., Iowa State College, 1902.
- LOLA ANNE PLACEWAY. 1905, 1896..Associate Professor of Chemistry
B. S., Iowa State College, 1895.
- VINA ELETHE CLARK. 1897.....Librarian
- JOHN PIPER WATSON. 1904.....Physical Director
- CHARLES BEECHER STANTON. 1907..Associate Professor of Rail-
way Engineering
C. E., Rensselaer Polytechnic Institute, 1903.
- IRA ABRAHAM WILLIAMS. 1907, 1898..Associate Professor of Geology
and Mining Engineering
B. S., Iowa State College, 1898; M. S., Iowa State College, 1903;
A. M., Columbia, 1904.
- JOHN EDWARD KIRKHAM. 1907..Associate Professor of Structural
Engineering
B. S., in C. E., Missouri, 1895.
- WINFRED FORREST COOVER. 1907, 1904..Associate Professor of
Chemistry
A. B., Otterbein University; A. M., Ohio State University.
- WAYNE DINSMORE. 1907..Associate Professor of Animal Husbandry
B. S. A., Iowa State College, 1904.
- LAURENCE C. HODSON. 1907, 1906..Associate Professor of Mining
Engineering
B. C. E., 1898; E. M., Michigan College of Mines, 1901.
- CHARLES ANDERSON SCOTT. 1908..Associate Professor of Forestry
B. S. A., Kansas Agricultural College, 1901.

ELIZABETH MACLEAN. 1908, 1899...Associate Professor of English
B. Di., State Normal, Iowa, 1894; M. Di., 1900; B. Ph., Chicago,
1909.

MARK PERKINS CLEGHORN. 1908, 1902....Associate Professor of
Mechanical Engineering
B. S. in E. E., 1902, Iowa State College, M. E., 1907.

ADOLPH SHANE. 1908, 1904.....Associate Professor of Electrical
Engineering
B. S. in E. E., Nebraska, 1901; E. E., Iowa State College, 1908.

CHARLES CURTIS MAJOR. 1908..Associate Professor of Mechanical
Engineering
M. E., Blomberg Normal School, Pa., 1891; M. E., Cornell Uni-
versity, 1898.

MARTIN MORTENSEN. 1908.....Associate Professor of Dairying
B. S. A., Iowa State College, 1909.

WILLIAM MILTON BARR. 1909..Associate Professor, Metallurgy in
Mining Engineering
B. S., Iowa, 1902; A. M., Grinnell, 1904; Ph. D., in Chemistry,
Pennsylvania, 1908.

WILLIAM WALLACE DIMOCK. 1909..Associate Professor, Veterinary
Medicine
B. Agr., Connecticut Agricultural College, 1901; D. V. M., Cornell
University; D. V. M., University of Habana, 1907.

ASSISTANT PROFESSORS.

ALEXANDER STEWART THOMPSON. 1907..Director of Music, Piano,
Pipe Organ and Voice
Royal College, London; Guild Hall School of Music, London.

CLARA DUTTON-THOMPSON. 1907..Vice-Director Voice, Preparatory
Piano and Organ
Cazenovia Seminary; Guild Hall School of Music.

JOSEPH EDWARD GUTHRIE. 1904, 1902....Assistant Professor of
Zoology
B. S., Minnesota, 1900; M. S., 1901.

THOMAS HARRIS McDONALD. 1905, 1904...Assistant Professor, Civil
Engineering in Charge of Good Road Investigations
B. C. E., Iowa State College, 1904.

ERNEST ALANSON PATTENGILL. 1906, 1900...Assistant Professor
of Mathematics
B. S., Iowa State College, 1897; B. S., Cornell University, 1899.

- JULIA TRUEMAN COLPITTS. 1906, 1900.....Assistant Professor of
Mathematics
A. B., Mount Allison University, Canada, 1899; A. M., Cornell
University, 1900.
- LOUIS BERNARD SCHMIDT. 1906....Assistant Professor of History
Ph. B., Cornell College, 1901; A. M., 1906.
- ROY A. NORMAN. 1907..Assistant Professor of Mechanical Engineering
B. M. E., Iowa State College, 1903; M. E., Iowa State College, 1909.
- HOWARD CARLTON FORD. 1907..Assistant Professor, Surveying and
Irrigation
B. S. (C. E.), Colorado, 1904; M. S., 1905; C. E., 1907.
- ARTHUR HENRY HOFFMAN. 1907, 1905....Assistant Professor of
Physics
A. B., Iowa Wesleyan, 1897; A. M., 1905; B. S. in E. E., Iowa State
College, 1905.
- WILLIAM BALLENTYNE ANDERSON. 1907, 1905..Assistant Professor
of Physics
B. S., Wisconsin, 1901; M. S., 1903; Ph. D., 1906.
- ELIZABETH MOORE. 1908, 1904.....Assistant Professor of English
Ph. B., Iowa College, 1900; Ph. M., Chicago, 1902.
- SYBIL M. LENTNER. 1908, 1904..Assistant Professor of Public Speaking
B. S., Iowa State College, 1900.
- WINNIFRED RICHARDS TILDEN. 1908, 1904....Physical Directress
B. A., Mount Holyoke, 1904.
- CAROLYN GRIMSBY. 1908, 1905.....Reference Librarian
B. S., Iowa State College, 1905.
- DORA GILBERT TOMPKINS. 1908, 1905.....Assistant Professor of
English
A. B., Monmouth College, 1893; A. M., Knox College, 1898.
- JULIA RAMSEY VAULX. 1908, 1906..Assistant Professor of English
A. B., Arkansas, 1894; A. M., Cornell University, 1897.
- HOWARD CASTNER PIERCE. 1908, 1906....Assistant Professor of
Animal Husbandry, in Charge of Poultry
B. S. A., Cornell University, 1907.
- ROY HIRAM PORTER. 1908, 1906....Assistant Professor, Mechanical
Engineering
B. M. E., Maine, 1906.
- *M. I. EVINGER. 1908, 1906..Assistant Professor of Civil Engineering
B. C. E., Iowa State College, 1906.

*One year leave of absence.

- JOHN EDWIN BRINDLEY. 1908, 1907.....Assistant Professor of
Economic Science
B. L., Wisconsin, 1902; A. M., 1906.
- HAROLD EDWARD BEMIS. 1908..Assistant Professor of Veterinary
Science
D. V. M., Iowa State College, 1908.
- ESTELLE FOGLE-BUCHANAN. 1909, 1904....Assistant Professor of
Botany
A. B., Parsons College, 1899; B. S., Iowa State College, 1903;
M. S., Iowa State College, 1908.
- C. E. BARTHOLOMEW. 1909, 1904..Assistant Professor of Entomology
B. S., Iowa State College, 1904; M. S.
- WILLIAM RANDOLPH RAYMOND. 1909, 1907..Assistant Professor
of English
A. B., Grinnell, 1894.
- EVERETT WALTER HAMILTON. 1909, 1907..Assistant Professor of
Agricultural Engineering
B. S. A., Iowa State College, 1907.
- EDWARD NORRIS WENTWORTH. 1909, 1907..Assistant Professor of
Animal Husbandry
B. S. A., Iowa State College, 1907; M. S. A., Iowa State College,
1909.
- ROY WINCHESTER CRUM. 1909, 1907..Acting Assistant Professor of
Civil Engineering
B. C. E., Iowa State College, 1907.
- JOSEPH FREDERICK BARKER. 1909, 1908..Assistant Professor of
Soils
B. S. A., Ohio, 1908.
- HARRY WOY GRAY. 1909..Assistant Professor of Civil Engineering
B. C. E., Iowa State College, 1906.
- WILLIAM HARPER PEW. 1909.....Assistant Professor of Animal
Husbandry
B. S. A., Iowa State College, 1907.
- RA G. McBETH. 1909.....Assistant Professor of Soil Bacteriology
B. S. A., Ohio, 1907; M. A., 1908.
- HOWARD SYLVESTER MURPHEY. 1909.....Assistant Professor of
Veterinary Medicine
D. V. M., Ohio, 1908.
- LULU GRAVES. 1909.....Assistant Professor of Domestic Science
B. Ed., Chicago, 1908.

ROY EVERETT ROUDEBUSH. 1909..Assistant Professor of Mechanical Engineering
A. B., Indiana, 1903; M. E., Cornell University, 1907.

ARCHIBALD LEITCH. 1909..Assistant Professor of Animal Husbandry
in Charge of Dairy Farm
B. S. A., Ontario Agricultural College, 1905.

JOHN HAROLD GORDON. 1909.....Assistant Professor of Dairy Bacteriology
B. S. in Agr., Missouri, 1909.

GILBERT T. GUTHRIE. 1909.....Assistant Professor of Dairying
B. S. A., Iowa State College, 1909.

LELIA PURDY. 1909.....Assistant Professor of Domestic Art

HARRY BAINE POTTER. 1910....Assistant Professor of Farm Crops,
B. S. in Agr. Purdue University, 1909

INSTRUCTORS.

EZRA CORNELIUS POTTER.....Instructor in Pattern Shop, 1898
ANNIE WILSON FLEMING, B. S....Instructor in Mathematics, 1900
GRACE ISABEL NORTON, B. A.....Instructor in German, 1901
WARD MURRAY JONES, B. C. E.....Instructor in Mathematics, 1902
JESSE GREENLEAF HUMMEL, B. M. E.Instructor in Machine Shop,
1903

EDWARD MERRITT SPANGLER.....Instructor in Pattern Shop,
1905, 1904

ETHYL BURR CESSNA, B. S.....Instructor in History, 1905, 1904

CHARLES ELMER ELLIS, M. S. A..Instructor in Ceramics, 1906, 1903

LOLA STEPHENS, B. S.....Instructor in Chemistry, 1906, 1905

LAURA MAY TAGGART, B. S....Instructor in Chemistry, 1907, 1906

MABEL CAMPBELL, B. S., B. D. S..Instructor in Domestic Science,
1907, 1906

LOUISE PETERS, A. M.....Instructor in German and Spanish, 1907

INGEBORG G. LOMMEN, M. L.....Instructor in German, 1907

WILLIAM KUNERTH, A. B.....Instructor in Physics, 1907

HELEN FLORENCE SMITH, A. B....Instructor in Mathematics, 1907

FREDERICKA VON TRICE SHATTUCK, B. A..Instructor in Public
Speaking, 1907

JOSEPH B. VARELA.....Instructor in Mechanical Drawing, 1907

JOHN THAXTER BATES, B. M. E..Instructor in Mechanical Engineer-
ing, 1908, 1907

JAMES WILLIAM CAMERON...Instructor in Forge Work, 1908, 1907

JOHN A. SAWIN.....Instructor in Foundry, 1908, 1907

AGNES GINA MOSHER, M. S.....Instructor in Mathematics, 1908
CARRIE C. WATTERS, B. A.....Instructor in History, 1908
MRS. MARY PETERS FAIRFIELD, B. A...Instructor in French, 1908
MRS. MARGARET ALISON ARVILLE, A. B..Instructor in Spanish
and French, 1908
MARY MAKEPEACE MORRIS, Ph. B.....Instructor in English, 1908
MARIE ZIMMERMAN, A. B.....Instructor in German, 1908
RUTH BOGARDUS SAFFORD, B. L.....Instructor in English, 1908
MYRICK WHITING PULLEN, B. S. in E. E...Instructor in Electrical
Engineering, 1908
HENRY NESS, B. S. A.....Instructor in Zoology, 1909, 1906
ROYAL EDGAR JEFFS, B. S. A.....Instructor in Botany, 1909, 1907
ADDISON HERBERT CHADSEY.....Instructor in Dairy, 1909, 1907
DANIEL WILLIS SYLVESTER..Instructor in Agricultural Engineer-
ing, 1909, 1908
CHARLES OSMOND ALEXANDER, B. M. E..Instructor in Agricul-
tural Engineering, 1909, 1908
CHARLES MURRAY, B. Pe.....Instructor in Bacteriology, 1909, 1908
ROY EUGENE SMITH, B. S. A.....Instructor in Soils, 1909
ELMER VERNON GRIGGS, B. S. in E. E., B. M. E.....Instructor in
Mathematics, 1909
VIVIAN DANGERFIELD BEARD, B. C. E..Instructor in Civil En-
gineering, 1909
ROGER SHERMAN MACINTOSH, B. S. A..Instructor in Horticulture,
1909
CHARLES ALTON BAUGHMAN.Instructor in Civil Engineering, 1909
HERBERT JOHN PLAGGE, B. S..Instructor in Physics and Illuminat-
ing Engineering, 1909
ESTHER LEIPER COOPER, Ph. B.....Instructor in English, 1909
FRANK LEWIS ODELL.....Instructor in Dairy, 1909
GEORGE RUPERT MACMINN, A. B.....Instructor in English, 1909
WILLIAM ALFRED BEVAN, B. S.....Instructor in Physics, 1909
FRANCIS WILBER DICKEY, A. M.....Instructor in Economic and
Political Science, 1909
HENRY ELLSWORTH EWING.....Instructor in Zoology, 1909
INGENBORG SWENDSEN TUNE.....Instructor in Music, 1909
NORRIS EARLE MITCHELL.....Instructor in Violin, 1909
JOHN HUG, B. M. E.....Instructor in Machine Shop, 1909
N. LEERBERG.....Instructor in Mechanical Engineering, 1909
GEORGE LIVINGSTON..B. S. in Agr. Instructor in Farm Crops, 1910

RESIDENT LECTURER.

GEORGE JUDISCH.....Lecturer in Pharmacy, 1901

ASSISTANTS.

HARRIETTE KELLOGG, A. M.....Curator of the Herbarium, 1903
GEORGE MITCHELL.....Farm Foreman, 1906

MARGARET FORGEUS, A. B.....Library Cataloguer, 1906
 CHARLES L. MUNDHENK.....Brass Instruments, 1906
 CAROLINE E. LAIRD..Assistant Librarian, Engineering Library, 1907
 VERA MORLAN DIXON, B. S..Assistant Librarian, General Library,
 1908
 CLIFFORD VERNE GREGORY..Assistant in Agricultural Journalism,
 1908
 CHESTER CHARLES FOWLER, B. S. in Chemical Engineering..As-
 sistant in Chemistry, 1909
 JESSE McKEEN, B. S.....Assistant in Chemistry, 1909
 ORIN L. KIPP, B. S.....Assistant in Chemistry, 1909
 ROBINA MARGUERITE RAE.....Assistant Librarian, Agricultural
 Library, 1909
 SOPHIE HARGIS, B. S.....Assistant in Chemistry, 1909
 MELLIE MORRIS SMITH.....Assistant Cataloguer, Library, 1909
 NELLIE NAYLOR, B. A.....Assistant in Chemistry, 1909
 JOHN ROY CAMPBELL, B. S. A.....Assistant in Botany, 1909
 JOHN REARDON.....Gardener, 1909
 BRUCE A. COLE..Mechanician, Civil and Electrical Engineering, 1909

STUDENT ASSISTANTS.

EDNA EVERETT.....Student Assistant in English, 1908
 WILLIAM A. LIPPINCOTT, A. B..Student Assistant in Poultry Hus-
 bandry, 1908
 C. R. SHUMWAY.....Student Assistant in Zoology, 1908
 ETHEL McDONALD....Student Assistant in Domestic Economy, 1909
 C. COYKENDALL.....Student Assistant in English, 1909
 A. F. LUNDGREN.....Student Assistant in English, 1909
 SUSIE KNUDSON.....Student Assistant in Mathematics, 1909
 E. S. ESTEL.....Student Assistant in Dairying, 1909
 WILLIAM E. WILBUR.....Student Assistant in English, 1909
 ROY TRUAX.....Student Assistant in Bacteriology, 1909
 JOSEPHINE CALONKEY....Student Assistant in Mathematics, 1909
 J. E. O'LEARY.....Student Assistant in Civil Engineering, 1909
 EVERETT W. LAMBERT, B. S..Graduate Assistant in Mining Engin-
 eering, 1909
 R. F. MILLER, B. S. A.—Graduate Assistant in Animal Husbandry, 1909
 FLORENCE ARMSTRONG.....Assistant in English, 1909

Agricultural Experiment Station Staff

ALBERT BOYNTON STORMS, A. M., LL. D. President Ex-Officio
CHARLES FRANKLIN CURTISS, M. S. A., D. S. Director
WILLARD JOHN KENNEDY, B. S. A. Vice Director and Animal
Husbandry
LOUIS HERMANN PAMMEL, B. Ag., M. S., Ph. D. Botanist
HENRY ELIJAH SUMMERS, B. S. Entomologist
WILLIAM HENRY STEVENSON, A. B., B. S. A. Soils
LOUIS G. MICHAEL, B. S. Chemist
SPENCER AMBROSE BEACH, B. S. A., M. S. Horticulturist
ARTHUR THOMAS ERWIN, B. S., M. S. A. Assistant Horticulturist
JAY BROWNLEE DAVIDSON, B. S., M. S. A. Agricultural Engineering
CHARLES ANDERSON SCOTT, B. S. A. Forester
CHARLES HENRY STANGE, D. V. M. Veterinary
ROBERT EARLE BUCHANAN, M. S. Bacteriologist
VINA ELETHE CLARK. Station Librarian
MARTIN MORTENSEN, B. S. A. Dairying
EDWIN ELIAS LITTLE, M. S. A. Assistant Horticulturist
WILLIAM WALLACE DIMOCK, D. V. M. Veterinary
MISS CHARLOTTE MARIA KING. Assistant in Botany
MISS HARRIETTE KELLOGG, A. M. Assistant in Botany
MATTHEW LEANDER KING, B. M. E. Experimentalist in Agricultural Engineering
FRED ERVING COLBURN. Photographer
HOWARD CASTNER PIERCE, B. S. A. Poultry
IRA G. McBETH, B. S. A. Assistant in Soil Bacteriology
LYMAN CRANE BURNETT, M. S. A. Assistant in Farm Crops
ROBERT LORENZO WEBSTER, A. B. Assistant in Entomology
LAURENZ GREENE, B. S. A., M. S. A. Assistant in Horticulture
ARCHIBALD LEITCH, B. S. A. Assistant in Animal Husbandry
JOHN HAROLD GORDON, B. S. in Ag. Assistant in Dairy
Bacteriology
HENRY HERBERT KILDEE, B. S. A. Experimentalist in Animal
Husbandry
SAMUEL L. JODIDI, B. S., Ph. D. Experimentalist in Soils
STELLA AGNES HARTZELL, B. Sc., A. M. Assistant Chemist
B. A. MADSON, B. S. A. Assistant Chemist
SEYMOUR C. GUERNSEY, B. S. A. Assistant Chemist
ALFRED A. WELLS, B. S. Assistant in Soils
LEE W. FORMAN, B. S. A. Field Superintendent in Soils
ROBINA M. RAE. Assistant in Station Library
CLIFFORD VERNE GREGORY. Editor, Station Bulletins
WILLIAMS ADAMS LIPPINCOTT. Assistant in Poultry

Agricultural Extension

ALBERT BOYNTON STORMS, A. M., LL. D.....President, Ex-Officio
CHARLES FRANKLIN CURTISS, M. S. A.....Dean of Agriculture,
Ex-Officio

AGRICULTURAL EXTENSION STAFF.

PERRY GREELEY HOLDEN, M. S., B. Pd.....Superintendent
ASHLEY VAN STORM, Ph. B.....Schools
RALPH K. BLISS, B. S. A.....Animal Husbandry
ADDISON H. SNYDER, B. S.....Soils
MISS EDITH GRAINGER CHARLTON.....Domestic Economy
MISS NEALE S. KNOWLES.....Domestic Economy
GEORGE RAYMOND BLISS, B. S. A.....Horticulture
H. C. PIERCE.....Poultry
H. V. CALDWELL, B. S. A.....Assistant in Farm Crops
HAROLD FREDERICK LUICK, B. S. A.....Dairying
CHARLES C. R. BUSH, B. S. A.....Animal Husbandry and Dairying
LESLIE EUGENE TROEGER, B. S. A..Assistant in Animal Husbandry
MISS LURA PHILLIPSAssistant in Schools
E. Y. CABLE.....Student Assistant in Agricultural Engineering

Iowa Highway Commission

ANSON MARSTON, C. E.....Director
CHARLES FRANKLIN CURTISS, M. S. A., D. S.....Director
THOMAS H. MACDONALD, B. C. E.....Highway Engineer
JAY BROWNLEE DAVIDSON, B. S., M. E.....Engineer of Road
Machinery
JOHN EDWARD KIRKHAM, B. S. in C. E..Consulting Bridge Engineer
C. S. NICHOLS.....Assistant Highway Engineer

Graduate Courses

The Iowa State College offers the degree of Master of Scientific Agriculture (M. S. A.) to Bachelors of Science in Agriculture who are graduates of this College or to others offering equivalent courses of study, the degree of Master of Science (M. S.) to Bachelors of Science who are graduates of this College or of other colleges offering equivalent courses of study, the degree of Master of Agricultural Engineering (M. A. E.) to Bachelors of Science in Agricultural Engineering who are graduates of this College or of other Colleges offering equivalent courses of study, and also Professional degrees in Engineering.

MASTER'S DEGREE.

The opportunity for resident study after graduation is a privilege granted only upon the recommendation of the President with the advice and consent of the Committee on Post-Graduate Study and the professors in charge of the departments in which the studies are to be pursued.

The candidate shall spend at least one academic year in residence. If only one year is spent in residence, the candidate shall devote his entire time to his post-graduate studies, except in cases where work previously done *in absentia* is accepted at the beginning of the student's residence by the Professor in charge of the major subject. Such *in absentia* work shall constitute not more than one-half of the required work. In the case of graduates of this college, temporary leave of absence for special study elsewhere may be granted during the year's residence. In order to be entitled to his degree, the candidate must meet within four years the requirements existing at the time of matriculation, otherwise he must complete any additional requirements which may be in force at the time of his final examination.

Two lines of work shall be selected, designated as major and minor studies, the former to be given two-thirds and the latter one-third of the time. The major study shall be research work, the results of which shall be incorporated in a thesis. The major and minor studies shall be so selected as to support and strengthen each other. No under-graduate study shall be selected as a major study. Under-graduate studies may be taken for part of the minor work only with the approval of the Committee on Post-Graduate Study, and the heads of the departments in which the work is to be done. The candidate shall have a reading knowledge of French or German.

Application for graduate study, specifying the departments in

which the major and minor subjects are to be taken, shall be filed with the President within four weeks of the beginning of the first term's resident work, which, in all cases, shall be not later than October 1st. next preceding the commencement at which the degree is to be granted.

A detailed outline of the work to be done in the major and minor subjects approved by the heads of the departments in which the work is to be taken shall be filed with the Committee on Post-Graduate Study, within eight weeks of the opening of the semester in which resident work is begun.

The candidate for the master's degree shall apply in writing for examinations not later than May 1st; and such examinations shall be given not later than May 15th.

Graduates of other institutions desiring to become candidates for post-graduate degrees in this institution shall be required to show to the Committee on Post-Graduate Study evidence of under-graduate work equivalent to the corresponding course in this institution, and if any deficiency appears in the subjects elected for post-graduate work, to make up such deficiency.

Candidates for advanced degrees are expected to appear on the Commencement stage to receive such degrees.

FEEES.

A matriculation fee of fifteen dollars (\$15.00) is charged to all graduate students. This fee is paid at the Treasurer's Office and the receipt shown to the chairman of the Post-Graduate Committee at the time of first registration.

Laboratory fees are charged in each laboratory for the material used, the amount being arranged with the Head of the Department.

Diploma fee for Master's Degree is five dollars (\$5.00).

GRADUATE WORK IN AGRICULTURE.

AIMS AND METHODS.

It is the aim of the College of Agriculture to furnish facilities for advanced study commensurate with the demand. By means of this advanced work the College seeks to awaken in the minds of capable men and women an appreciation of research and the advancement of learning, to the end that they may effectively aid, not only in the teaching of agriculture, but also in extending the boundaries of agricultural knowledge. Nearly all of the best positions open in agricultural research and instruction work now require post-graduate training.

The College of Agriculture aims to give advanced instruction of a high character in each of its departments. No set courses of study leading to the Master's degree are provided, but each candidate for

this degree pursues an independent line of special research, original in character, outlined with the advice of the professors, and carried out under their direction. Seminars are largely employed and especial efforts are made to bring the graduate student into contact with the research problems of his department of study. To this end capable students often take a part in the investigation work of their instructors.

EQUIPMENT.

The College of Agriculture is well equipped for Graduate work. Each of the departments is provided with commodious laboratories which are fitted up with apparatus and equipment of the most approved design. In addition, large herds and flocks, a large number of field plots devoted to soil and crop investigations, and extensive orchards and plant breeding grounds offer the student excellent facilities along Animal Husbandry, Agronomy, and Horticultural lines. The Dairy and Agricultural Engineering departments have buildings and equipment which are unsurpassed for work in their respective fields. A splendid library has recently been installed in the new Hall of Agriculture which provides unusual facilities for graduate students. Within the past few years hundreds of valuable books containing the results of the most noted foreign investigators have been added to this library.

In the following pages will be found grouped together the lines of agricultural work which are offered graduate students.

FARM CROPS.

Graduate work in Farm Crops comprises investigation of biological phenomena of growing crops, with a view to recognizing the operation of the laws of plant breeding. It also includes an opportunity for investigation of station methods and for putting them into practice.

Cereal Breeding: An opportunity is given through the records of the Experiment Station, and through actual work in progress on the experimental field, to investigate the operation of the laws of plant breeding as applied to farm crops. This investigation will include an extended study of correlations of characters in growing strains of corn and small grain. A study of the transference of characters in generations of plants of hybrid origin gives an excellent opportunity for tracing Mendelian principles.

Experiment Station Methods: Special opportunity for practice in experiment station methods of conducting scientific tests of farm crops are offered on the extensive experimental grounds of this institution. Besides making a study of the methods in vogue at this station, an opportunity is given for an investigation of the methods in operation at other leading experiment stations of this country.

General Crop Problems: Unsolved problems of growth and the harvesting and storage of the several cereal crops offer inviting lines for valuable research. The commodious laboratories of the Farm Crops Department, equipped with the best apparatus available, enables the investigator in this line to conduct satisfactory, scientific research into the many important unsolved problems.

SOILS.

Graduate work is offered in Soils which prepares the student for special work in the United States Bureau of Soils or in Colleges and State Experiment Stations. The work may be a continuation of work taken as an under-graduate in this College or of any line of soil study which has fitted the student to take up advanced work.

The graduate student will find excellent opportunities for investigations in soils along the following lines:

Soil Physics: Research in special subjects bearing on the physical characteristics of soils and their relation to crop production.

Soil Fertility: Special investigation of the factors which control the productive capacity of soils.

Soil Bacteriology: Original investigations of important problems in Soil Bacteriology, the department offering unusual opportunities along this line, especially in connection with the humus investigations which are now in progress.

Research in Soil Management: Investigations of the principles governing successful systems of soil management. Special studies relating to the management of particular soils such as gumbo, peats, sands, and alkali soils.

Seminar: Special investigation bearing on selected lines in Soils. The preparation and presentation of papers for discussion by the class.

DAIRYING.

Graduate work in dairying can be taken along any one of the following lines:

Buttermaking: The large, well equipped factory offers abundant opportunity for anyone desiring to specialize along this line. It gives facilities for advanced work in cream ripening, pasteurizing, starters, churning, separating, etc.

Creamery Management: Under this head investigational work is done along such lines as; cost of manufacture, economical methods of purchasing cream and supplies, disposal of the by-products of the factory, and improved methods of creamery accounting.

Cheese Making: The large, well equipped cheese room and cold storage rooms connected with it make a very complete laboratory in which to carry on investigational work in comparing different methods of making, curing and storing various kinds of cheese.

Testing Dairy Products and Milk Inspection: These subjects offer a great field for research, including comparisons of quick methods of analyzing the various dairy products with the well established official method and a study of improved methods of testing for preservatives and adulterations.

Advanced Work in Dairy Bacteriology: This work consists of laboratory investigation of problems along dairy bacteriology lines and assigned reading. The nature of the work is designed to fit the individual student.

ANIMAL HUSBANDRY.

Graduate work in Animal Husbandry may be taken along any of the following lines:

Animal Nutrition: Because of the large number of horses, cattle, sheep and swine-feeding experiments which are being conducted on the College Farm, the opportunities for doing research work in this line are unequalled.

Animal Breeding: Includes special work along new and original lines pertaining to principles underlying Animal Breeding.

Study of Breeds: With not only typical specimens, but also, in most cases, complete breeding herds of almost every recognized breed of live stock on the continent, the post-graduate student is offered unexcelled opportunity for studying breeds adapted to Iowa conditions.

Stock Judging: For this work, all the various market types of animals and good representatives of pure breeds are available. These are carefully studied on foot, then slaughtered for a block test and the exact percentages and values of various cuts determined.

Practical Management of Stock: This consists of a study and investigation of the methods employed on the best managed stock farms and breeding establishments in the United States, Canada, Great Britain, and other countries. Students are thus prepared to manage stock farms.

POULTRY HUSBANDRY.

Because of the newness and great scope of the field, Poultry Husbandry offers many opportunities for doing valuable research work. Unexcelled opportunities are offered for the common application of training which the student may have received in embryology, bacteriology, physics, zoology, entomology, farm architecture, etc. Some of the lines along which the student may work, are:

Breeding: Because of the shortness of generations and the widely varying characteristics in color and shapes of varieties, poultry offers unexcelled opportunities for study of unit characters in crossing and

in applying the laws of heredity. Work may also be done along the lines of breeding for meat type and increased egg production.

Feeding: Comparative studies are made of different rations for laying and breeding stock, rearing and fattening, or finishing. Comparison is made of breeds in regard to gains made on certain rations. Tests are also made of the effect of feeding on color of feathers or composition of flesh and eggs.

Housing: The work covers comparison of glass front, curtain front, or combination glass and curtain front houses; a comparison of large and small flocks; a study of colony houses and of poultry house sanitation.

Incubation: This branch of the industry is in great need of investigation because of its vast importance and the little knowledge we now have of its laws. Such lines of work could be taken up as: effect of moisture or non-moisture methods on the fertility of eggs and the vitality of chicks; value of carbon dioxide in incubation; study of natural methods; loss in weight in incubation; change in the structure and density of the shell; selection of chicks as they hatch for constitutional vitality; difference in incubation management for eggs of different classes of poultry.

Brooding and Rearing: Brooding in large versus small flocks; natural versus artificial brooding; study of brooder diseases; effects of temperature on health and growth of chicks—all these are part of the course.

Poultry Diseases and Pests: This includes a study of cholera, sorehead, black head, roup, and other poultry diseases with a view to prevention and cure, and also a study of lice, mites, rats and other pests, with a view to their extermination.

HORTICULTURE AND FORESTRY.

Graduate students find here opportunity for investigation in Horticulture and Forestry in the following subjects. Work in Forestry is offered for minor subjects only:

Plant Breeding: The investigation of principles and methods of plant breeding. The plant breeding work of the Iowa Experiment Station is continually developing an abundant supply of material for the study of heredity, variation, and selection, particularly with the apple.

Plant Propagation: The greenhouses, garden, and orchards are available for investigations concerning the principles and technique of plant propagation.

Pomology: A special study of horticultural species with reference to their original geographical distribution, to their variation under cultivation, and to the development of distinct types and economic importance.

Research: Problems for horticultural investigation other than those suggested above, undertaken in special lines for which the students may be best prepared.

Forest Botany, or Dendrology: Systematic and biologic forest geography.

Silviculture: The methods of producing a forest crop and of influencing its progress.

Wood Technology and Timber Physics: The structural and physical characters of woods, with the application of wood in the arts, with its requirements and working properties, and with the use of minor and by-products.

Forest Economics: A study of the relation of forests to climate, soil, water, health, ethics, etc. This is a study of commercial peculiarities and of the positions of forests and forestry in political economy.

Forest Mensuration: Methods of ascertaining volumes and rates of growth of trees and stands of determining yields.

AGRICULTURAL ENGINEERING.

Students may take up graduate work along any of the many lines of Agricultural Engineering. This training will prepare them for government positions in agricultural engineering lines, for teaching in agricultural colleges, or for becoming managers or superintendents of farms. Investigation may be carried on along any special lines which they are fitted to pursue. The following subjects are suggested:

Irrigation: Studying the principles employed and the machinery used and its efficiency, also practical work in sewage irrigation on the College Farm.

Farm Architecture: The locating, designing, constructing, drawing up specifications and contracts, and estimating cost of all farm buildings.

Road Construction: Intended to fit students for highway engineers.

Investigation of Farm Implements: Their construction and efficiency, also comparison of different makes. The department, having an equipment of \$20,000.00 worth of modern implements, offers splendid opportunities for this line of investigation.

Farm Motors: The efficiency of steam traction and gasoline engines, also a comparison with the horse as power.

Drainage: Intended to fit students for drainage engineers. The cooperative experiments of this department with the United States Department of Irrigation and Drainage Investigation, furnish a good opportunity for study along this line.

Division of Agriculture

CHARLES FRANKLIN CURTISS, DEAN.

SPENCER AMBROSE BEACH, VICE-DEAN.

The division of Agriculture offers to its students work in any of the following courses:

Course in Agronomy.

Course in Dairying.

Course in Animal Husbandry.

Course in Horticulture and Forestry.

Course in Agricultural Engineering.

Course in Science and Agriculture.

These courses are so arranged as to furnish a good foundation from which a student may become either a successful farmer or may develop into a specialist in one of the many branches of the agricultural industry. The department offers short as well as the regular four year courses, the difference being due largely to the degree in which the student wishes to specialize in any line of work. The farm as it is usually conducted is a union of many divisions of industry, and the shorter course confines itself to laying a foundation that will secure success in all of these, while the longer course seeks to direct the student into that line which will call forth and centralize his special ability and at the same time enable him to meet the variety of conditions that under all circumstances surround a successful life.

Past experience with these courses shows that they have met with more than the usual success in attaining their objects; as the shorter course has been productive of many successful farmers, and the longer course has been unusually successful in developing better farmers and more capable men in practical life and also in securing for our graduates prominent positions in the agricultural faculties of other colleges.

In the courses in practical agriculture, a field of work which is unsurpassed by any other college in the United States is open to our students. The national government gives to the college about thirty-five thousand dollars annually for original experimentation and instruction in agriculture and the sciences related to this industry. This supplemented by liberal state aid, enables the College authorities to make the fields and the barns veritable laboratories of extensive and

most practical investigation and observation. The range is from the soil which produces, through all of its natural characteristics to whatever is grown in agriculture from germ to finish.

The farm consisting of 1,200 acres of rolling prairies, bottom and woodland is stocked with good representatives of six breeds of horses, seven breeds of cattle, seven breeds of sheep and six breeds of hogs. These animals are used in class illustration and for the various experiments in breeding and feeding for milk, meat, wool, growth and maintenance, conducted by the Experiment Station as a department of the College. All the crops are grown for some educational purpose; all the animals are fed by rule and system, and the result of their management reported upon and used in class work.

Two commodious, well-lighted stock judging pavilions have recently been constructed, into which live animals are brought in the presence of the teacher and the class for careful study and intimate knowledge. An experimental barn with the recent and most approved methods of stalls, feeding and ventilation, is devoted exclusively to the original work of animal husbandry and agronomy, the work ranging over all the questions of breeding and maturing domestic animals.

The work of this department is designed to teach the sciences that underlie practical agriculture, and sufficient English, literature, mathematics, history, and other supplementary studies to sustain both scientific and practical agriculture and to develop the agricultural students to the level of the educated in any profession. Special attention is given to the improved methods in all of the various operations of farming, farm building, use of tools and machinery, and management of all kinds of stock and crops. The instruction embraces not only the principles, but also the practices of agriculture.

AGRICULTURAL COURSES.

All students classified in the courses in Agronomy, Dairying, Animal Husbandry and Horticulture will take the same work until the beginning of the Sophomore year, when the selection of the desired course will be made by the student. Students classified in the courses in Agricultural Engineering and Science and Agriculture will take the Freshman work as shown in the list of studies given for those courses.

****Freshman Year.**

FIRST SEMESTER.

Required
Semester Hours

Agricultural

Engineering 1 or 2,

Shop Work

1½

Animal Husbandry 1,	Market Types of Cattle and Sheep 2	
Farm Crops 1,	Corn Growing and Judging	2½
Horticulture 14,	Farm Forestry	2½
Veterinary 56,	Anatomy of Domestic Animals	1
English 10,	Narration and Description	3
Mathematics 17,	Algebra and Trigonometry	3
History 19,	The Making of the Nation	
	1783-1817	2
Military 1,	Military Drill	..
Library 1,	Library Instruction (4 hours	
	during semester)	
		—
	Total semester hours	17½

SECOND SEMESTER.

		Required Semester Hours
Agricultural		
Engineering 1 or 2,	Shop Work	1½
Animal Husbandry 2,	Market Types of Dairy Cattle,	
	Horses and Swine	2
Dairying 12,	Farm Dairying	2½
Farm Crops 2,	Small Grains	2½
Horticulture 2,	Plant Propagation	2½
English 11,	Exposition	3
Physics 205,	Mechanics, Heat and Light	3
Military 2,	Military Drill	..
		—
	Total semester hours	17½

Department of Agronomy

Agronomy is the science of the Field and its crops. It treats of Farm Management, the application of economic business methods to farm practices; Field Crops, their classification, production and improvement; Soils, their fertility, cultivation and improvement. The Department of Agronomy consists of the two coordinate Departments, Farm Crops and Soils.

COURSE IN AGRONOMY.

For Freshman year see Agricultural Course, page 23.

**Freshmen who show deficient preparation in English or Mathematics may be assigned by the Dean of the Junior College and the Dean of Agriculture, to special classes, with one hour more work than indicated above, and in case of clear indication of failure in either of these subjects, even with this arrangement they will be dropped from the Freshman work in this line until they have given proof of sufficient preparation to enable them to carry the work successfully.

Sophomore Year.

THIRD SEMESTER.

Required
Semester Hours

Agricultural Engineering 4,	Farm Engineering	3½
Farm Crops 3,	Corn Breeding and Judging	2
Animal Husbandry 3,	Breed Types of Cattle and Sheep	3½
Horticulture 4,	Plant Breeding	3
Botany 24,	Embryogeny	1
Agricultural Chemistry 21,	Elementary Experimental Chem- istry	5
English 12,	Argumentation	2
Military 3, or Athletics		..

Total semester hours 19½

FOURTH SEMESTER.

Required
Semester Hours

Agricultural Engineering 5,	Farm Machinery and Farm Motors	2½
Farm Crops 4,	Grain Breeding and Judging	2
Animal Husbandry 4,	Breed Types of Dairy Cattle, Horses and Swine	3½
Zoology 16,	General Zoology	5
Agricultural Chemistry 23,	Elementary Experimental Chem- istry	5
Military 4, or Athletics		..

Total semester hours 18

Junior Year.

FIFTH SEMESTER.

Required
Semester Hours

Soils 1,	Soil Physics	4
Agricultural Chemistry 25,	Agricultural Analysis	4
Animal Husbandry 21,	Principles of Breeding	2
Zoology 4,	Entomology	4
Economic Science 9,	Outlines of Economics	3
Choice (*Farm Crops 19,	Seminar ½)	½
)*Soils 17,	Seminar ½)	

*These courses must be continued through the year. Final standing will not be certified to recorder until close of sixth semester.

Electives will be selected from the list on page 80, ½ to 2½

Total semester hours 18 to 20

SIXTH SEMESTER.

		Required Semester Hours
Soils 2,	Soil Fertility	4
Choice { Farm Crops 9,	Research Work 2}	2
{ Soils 3	Research Work 2}	
Bacteriology 1,	General Bacteriology	4
Botany 11,	Vegetable Physiology	4
Farm Crops 17,	Grasses, Forage and Fibre Crops 2	
Choice { *Farm Crops 19,	Seminar ½}	½
{ *Soils 17,	Seminar ½}	

*A continuation of work in fifth semester.

Standing will be for fifth and sixth semesters.

One hour credit for both semesters' work will

be recorded at end of the sixth semester. 16½

Electives will be selected from the list on page 80, 0 to 3½

Total semester hours 16½ to 20

Senior Year.

SEVENTH SEMESTER.

		Required Semester Hours
Soils 6,	Advanced Soil Fertility	2
Farm Crops 8,	Farm Management	3
Soils 8,	Soil Bacteriology	3
Choice { Soils 4,	Research Work 2}	2
{ Farm Crops 9 or 10,	Research Work 2}	
Animal Husbandry 20,	Animal Feeding	2
**Horticulture 3,	Orcharding	2½
Choice { *Farm Crops 20,	Seminar ½}	½
{ *Soils 18,	Seminar ½}	

*These courses must be continued through

the year. Final standing will not be certified to

recorder until the close of the eighth semester. 15½

Electives will be selected from the list on page 80, 5½ to 4½

Total semester hours 16 to 20

**The classes of 1911 and 1912 will take Horticulture 4, and Botany 24, instead of Horticulture 3.

EIGHTH SEMESTER.

		Required Semester Hours	
Choice	{ Farm Crops 15, Farm Crops 16, Soils 11, Soils 12,	Thesis 5 Thesis 5 Thesis 3 Thesis 3	3 or 5
	Botany 5,	Vegetable Pathology	3 3
	{ *Farm Crops 20, *Soils 18,	Seminar	$\frac{1}{2}$
		Seminar	$\frac{1}{2}$ $\frac{1}{2}$
*A continuation of the work in the fifth semester. Standing will be for seventh and eighth semester. One hour credit for both semesters' work will be recorded at end of eighth semester.		—	—
Electives will be selected from the list on page 80,		6½ to 8½	9½ to 13½
Total semester hours		16	20

Farm Crops Department.

HAROLD DE MOTT HUGHES, PROFESSOR.

HARRY BRAINE POTTER, ASSISTANT PROFESSOR.

GEORGE LIVINGSTONE, INSTRUCTOR.

H. V. CALDWELL, EXTENSION WORK.

The added facilities of their admirable quarters on the fourth floor of the Hall of Agriculture enable the Farm Crops Department to offer work in accord with the demands of the times. Commodious and well lighted class-rooms, with new and well equipped research laboratories, offer the best of facilities for lecture and laboratory work.

The general elementary work in cereal study is conducted in the grain laboratory on the second floor of the new stock and grain judging pavilion. The higher and more scientific study of crops is pursued in the new and well equipped corn and small grain laboratories on the fourth floor of the Hall of Agriculture. Research laboratories, equipped with chemical and general apparatus used in biological research, offer special opportunities for investigation to graduate students.

The increased demand for competent farm managers has far out-run the supply. The demand is increasing for trained men in farm crops, to fill positions as teachers of agriculture in secondary schools, assistants in seed houses, and assistants on the editorial staffs of agricultural journals. The number of men well trained in farm crops, who are putting in operation on the farm the principles and prac-

tices studied in college, is annually increasing. Many men who have taken special training in farm crops production and breeding, have returned to their farms, where they are making a profitable specialty of raising pure-bred corn or small grain.

Short Courses in Corn and Small Grain, January 2 to January 14, 1911, a winter course in corn and small grain study of two weeks' duration, has been established to meet the growing demands of the men who cannot possibly attend the regular courses in agriculture. In this course a careful study of the corn plant is made. A close study of the ear, according to the score card, reveals the essential points of ideal seed corn. The importance of testing seed corn is emphasized, and practice in germination box use is given. The characteristics of the important varieties of corn grown in Iowa, their adaptability to the market demands, and prevailing climatic and soil conditions are noted. Special training is given those desiring to fit themselves for corn and small grain judges at fairs, etc. Corn judging certificates are issued to those who pass the required examination conducted by the Iowa Corn Growers' Association; likewise small grain judging certificates are issued by the Iowa Small Grain Growers' Association to those attaining the required standard of proficiency in small grain study. For those students who have attended two short courses, an advanced course of study is offered. In this course special study is made of corn and of small grains. The principles of grain breeding are studied, and the methods employed by prominent farmers who are making a specialty of grain breeding are investigated.

To assist in covering added expenses of such a course the following fees are charged:

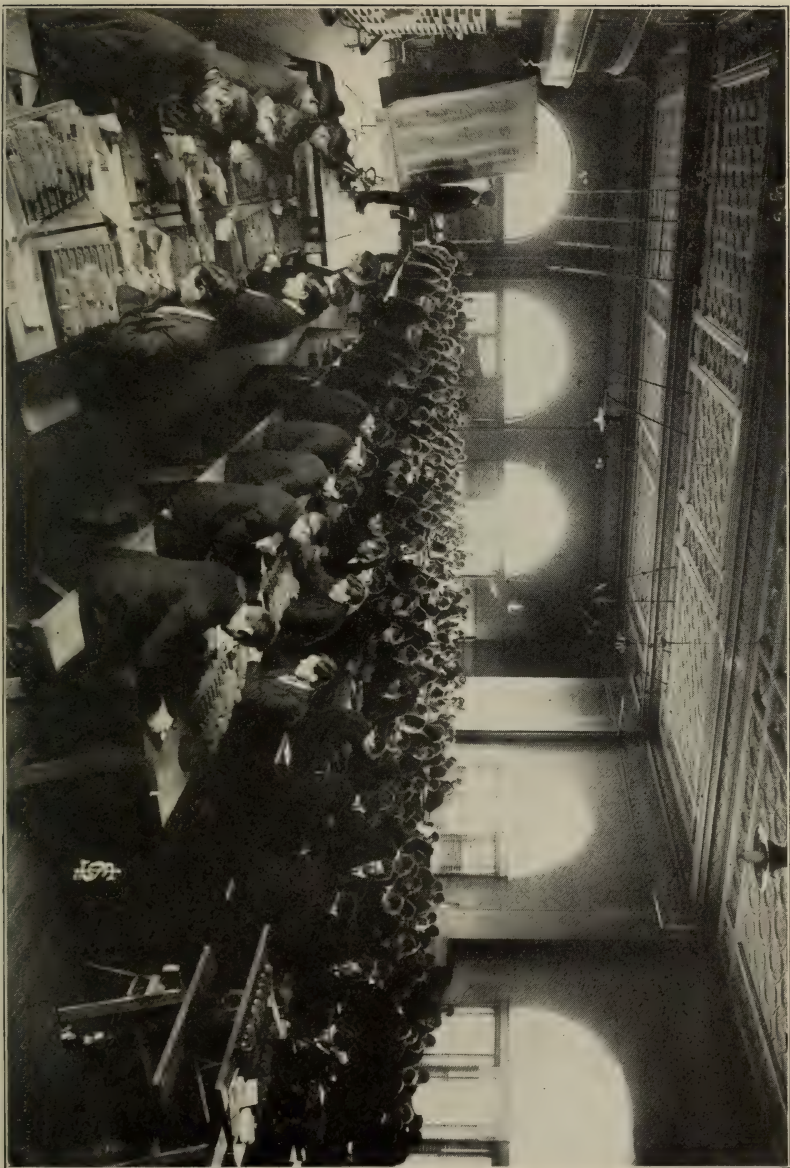
Residents of Iowa, \$3.00 for entire course.

Non-residents, \$5.00 for entire course.

This fee covers the cost of instruction in farm crops and live stock, or in farm crops and horticulture. The arrangement of the study course permits the student to spend equal time in farm crops and live stock studies, or in farm crops and horticulture.

METEOROLOGY AND CLIMATOLOGY.

The object of this course is to give the student a knowledge of the fundamental principles which govern weather and climate. The first half of the semester is devoted to a study of the elementary principles of meteorology. The student is acquainted with the instruments used by the weather bureau; the principles upon which they are based and their care and uses are explained. The last half of the semester is given to a consideration of the fundamental principles which control weather and climate. Throughout the entire course the charts and maps issued by the state and federal weather bureaus are used



A CLASS IN CORN JUDGING.

freely. The student is given practice on the construction and interpretation of charts, and in forecasting. Elective in all Agricultural Courses. See descriptive course under Geology.

COURSES IN FARM CROPS.

1. **Corn Growing and Judging.** Through lecture and recitation the class receives its instruction in the principles and requirements of the growth of the corn plant, methods of selecting, storing, testing, grading, planting, cultivating and harvesting. The cost of production and use of the crop are taken up in detail, and the requirements of the commercial marketing of corn are studied. Each division of this subject is studied from first hand knowledge, students being required to make excursions of observation to farms, factories, and markets. A part of the semester is spent in studying corn in the field with reference to per cent stand, barren stalks and suckers; leaf surface is measured and computed, and correlation of the parts of the stalk is made. Each student is required to make a record of his own plot, husk it, and select the seed ears and hang them up for storage and shrinkage test. A detailed study is made of the botanical structure of the corn-stalk, ear, and kernel according to a definitely outlined syllabus. Each student makes a germination box and carries on a test. The corn judging is limited entirely to score card practice, the student being urged to use a sample of home-grown corn. Two and two-thirds hours' credit. Recitations, two hours, and laboratory, two hours, per week. Fee, \$1.50.

2. **Small Grains.** Includes the study of the following small grains: Oats, wheat (winter and spring), barley, rye, emmer and speltz, and macaroni wheat; their adaptation to soil and climate, preparation of seed bed, methods of seeding, botanical structure, problems of germination and plant growth; also score card practice in small grains. Two and two-thirds hours' credit. Recitations, two hours, and laboratory, two hours, per week. Fee, \$1.50.

3. **Corn Breeding and Judging.** In this course a study is made of the origin of corn and its development. The characteristics of the leading varieties of corn are studied, and the adaptation of these varieties to the varying soil and climatic conditions of the state and country is made a special study. Principles of improvement and breeding are investigated. The breeding blocks in the station fields are visited and a special study of the variations and correlation of characters in the strains of corn being isolated, is made. The methods employed in the breeding of corn by other experiment stations and by prominent commercial corn breeders are studied. Corn judging is made a special feature in this course. Prerequisite, Farm Crops 1.

Two hours' credit. Lecture, one hour, and laboratory, three hours, per week. Fee, \$2.00.

4. **Grain Breeding and Judging.** In this course is presented a detailed study of important varieties of small grains produced in the state. The study of their origin and adaptability to the differing climatic and soil conditions of the location in which they are grown is made a special feature of study. The history of grain breeding and the development and nature of the experiment station methods, along with the principles of plant breeding underlying these methods, are investigated. Farm practices in the improvement of the small grain crops, especially those employed by some of the prominent farmers making a special feature of this farm enterprise, are studied. Grain judging forms an important part of this work, emphasizing the classification of the several types and varieties of small grain. The essential differences of the different classes and their desirable qualities are studied. The commercial grading of grains and the detection of grain impurities, such as weed seeds, etc., are emphasized. The uses for which the small grains are grown and the method of manufacture of products from this raw material are presented. Two hours' credit. Lecture, one hour, and laboratory, three hours, per week. Fee, \$2.00.

8. **Farm Management.** This course includes the study of the principles underlying farm management. Typical illustrations of the differing phases of specialized farming and of general farming are studied; problems of labor, fencing and marketing are considered, and methods employed by successful farmers are presented. A practical and thorough study of a system of farm accounts is a special feature of this course. Actual field study of the laying out and conducting of farms is made, and special exercises in planning of rotations, field locations, and placing of buildings, form an important part of this course. Three hours' credit. Three lectures per week. Fee, \$2.00.

9. **Research in Farm Crops.** Individual investigation of special problems relating to cereal, forage, and root crops. Experiments are conducted in both field and greenhouse. Investigations are made as to the effect of differing conditions of storage on vitality of seed, and the effect of different stages of maturity on vitality of seed of the different crops. Variations in physical structure of crops and investigation of reasons for, and importance of such variations; methods of reproduction of the several crops and also circumstances influencing the reproduction of these crops, are investigated. Prerequisite, Farm Crops 1 and 2. Two hours' credit. Laboratory, six hours per week. Fee, \$2.00.

10. **Advanced Research in Farm Crops.** This course offers opportunity for more advanced research into the problems of breeding of farm crops. A wider investigation of the principles of breeding may be made. Students with sufficient knowledge of chemistry may pursue the following lines of investigation: The causes of variation,

and the differences of chemical composition of the different varieties of cereals and forage crops, when these are subjected to differing conditions of soil and climate; the effect on the chemical composition of cereals of storing these under varying conditions of temperature and humidity. The effect on chemical composition of harvesting cereals at different stages of maturity, also forms an important phase of investigation in this course. The new and well equipped Farm Crops chemical laboratory furnishes special opportunity for investigation leading up to thesis work. Prerequisite, Farm Crops 9. Two hours' credit. Laboratory, six hours per week. Fee, \$5.00.

11. **Advanced Study of Corn.** This course presents a deeper study of the principles underlying the breeding of corn. It aims at putting the student in possession of the latest scientific knowledge of corn breeding. Advanced corn judging in this course fits the students for expert judges at fairs and expositions, and for specialists in corn production. A more thorough study of the leading varieties of corn growing in the state is made. Prerequisite, Farm Crops 3. Two hours' credit. Laboratory, six hours per week. Fee, \$3.00.

12. **Advanced Study of Small Grains.** A special study of the principles of plant breeding, as they are revealed by the breeding of small grains, is made. The evolution of plant breeding is studied. Special attention is given to experiment station methods and accomplishments in this line of work. The object of the course is to put the student in possession of the scientific facts and principles underlying this work, as well as to give him a working knowledge of scientific methods for the pursuit of such investigation. Grain judging is a special feature of this course. It is intended to fit the student for expert judging at fairs and expositions, and also to give him practical knowledge of grain, which he may use in the position of small grain specialist at grain centers. Adequate attention will be paid to the application of rules and regulations in commercial grading in operation at the several important grading centers. Prerequisite, Farm Crops 4. One and one-third hours' credit. Laboratory, four hours per week. Fee, \$3.00.

15. **Thesis.** This investigation must be pursued upon some subject requiring original work. Three hours' credit.

16. **Thesis.** Same as above, excepting that it is five hours' credit.

17. **Grasses, Forage and Fiber Crops.** In this course an exhaustive study will be made of the several grasses grown in the corn belt. This study will include an investigation into their composition, habits of growth, adaptability to various types of soils and climatic conditions, and methods of seeding and handling. Such forage and fiber crops as have been grown in Iowa, and others that could be profitably introduced, will be given study similar to the above. Special attention will be given to the growth and breeding of alfalfa and timothy. Two hours' credit. Lecture, one hour. Laboratory, three hours per week. Fee, \$2.00.

18. **Summer Course in Farm Crops.** A study of small grains, grasses and clovers; habits of early growth, structure, rate of growth, reproduction, variations, correlations, effects of different methods of planting. Also Experiment Station Methods, nature of an ideal experimental field, maintaining fertility on such a field, layout of test plots, desirable area of plots, variety testing, crop handling, record keeping and interpretation, cereal breeding, planting methods, note-taking, selection, hybridization, increasing and distributing valuable strains produced, and experimental methods adopted by leading experiment stations. Five hours' credit. Laboratory, three consecutive weeks, beginning immediately after commencement. Fee, \$5.00.

19. **Farm Crops Seminar.** The Juniors and Seniors in Farm Crops and Soils hold a joint seminar once each two weeks while college is in session. At each meeting papers prepared by students are presented and topics of special interest to Agronomy students are discussed. One hour credit.

20. **Farm Crops Seminar.** Continuation of Course 19. One hour credit.

Department of Soils.

WILLIAM HENRY STEVENSON, PROFESSOR.

JOSEPH F. BARKER, ASSISTANT PROFESSOR.

IRA G. MC BETH, ASSISTANT PROFESSOR OF SOIL BACTERIOLOGY.

ROY E. SMITH, ASSISTANT.

A. H. SNYDER, EXTENSION WORK.

A knowledge of the fundamental principles which underlie all successful systems of soil management should be the possession of every farmer. Without this knowledge he cannot produce maximum crops nor successfully maintain the fertility of his soil. And yet no greater obligation rests upon the American farmer than the conservation of our greatest natural resource, namely, the productive power of the land. It is the aim of the Soils Department to teach in a logical way the important principles concerning physical, plant food, and bacteriological soil factors. In order that this work may be carried on successfully, several courses are offered to undergraduate and graduate students, including courses in Soil Physics, Soil Fertility and Soil Bacteriology.

On the first floor of Agricultural Hall, five commodious and well appointed soils laboratories have been thoroughly equipped for accurate and scientific work. Apparatus of the latest design has been installed in these laboratories, thus affording excellent facilities for



THE SOLS LABORATORY.

regular, advanced, and graduate students in Soils. In addition to these excellent laboratory facilities, suitable greenhouses and field plots are available for certain lines of study and experimentation. The Department is also equipped with photographs, charts, and maps which are used in the lecture room and laboratory. Valuable and abundant data, which have been secured by the Soils Section from extensive soil experiments, prove very helpful to students who are specially interested in the problems relating directly to the soils of Iowa.

The work of the department is twofold; first, to fit young men to successfully solve the soil problems which are an integral part of every farmer's experience; secondly, to fit some students to creditably fill positions in Agricultural colleges and Experiment stations and in other institutions in which the subject of Soils is taught. There is a constantly increasing demand for men well trained in Soils.

COURSES IN SOILS.

1. **Soil Physics.** This course comprises a study of the origin, formation and classification of soils; soil moisture and methods of conserving it; the principles which underlie dry farming; soil temperature, and conditions influencing it; soil texture as affecting heat, moisture and plant food; surface tension, capillarity, osmosis, and diffusion as affecting soil conditions; the effect upon the soil and the crop of plowing, harrowing, cultivating, cropping, and rolling; washing of soils and methods of preventing the same; preparation of seed beds; cultivation and drainage as affecting moisture, temperature, root development and the supply of available plant food. The work also comprises the determination of the specific gravity, apparent specific gravity, volume weight, porosity, water-holding capacity, and capillary power of various soils; also a study of the effect of mulches on the evaporation of water from the soil and the physical effects upon the soil of different systems of rotation and of continuous cropping. Prerequisite, Physics 205. Four hours' credit. Lectures and recitations, three hours, and laboratory, three hours, per week. Fee, \$3.00.

2. **Soil Fertility.** This course comprises maintenance of fertility, fertilizers and rotations; the influence of commercial fertilizers, barnyard manure, and green manure upon the quality and yield of various crops; the effect of different crops upon the fertility of the soil and upon succeeding crops; different systems of rotation and the effect upon the productiveness of the soil of various methods of soil management; also a study of the storing, preserving, and application of farmyard manure. This work is supplemented by a study of manures, fertilizers and soils; their composition and agricultural value. Pot and field experiments are conducted to show the influence of fertilizers, applied to the soil in different quantities and at different times, upon the quality and yield of various crops. Special attention is given to leguminous crops as fertilizers and their place in crop rotation. A study is made of

special types of soil which are found in different sections of the state, such as clay, gumbo, loess, and peat, with special reference to the best methods of handling and cropping these soils. Prerequisites, Soils 1, and Chemistry 25. Four hours' credit. Lectures and recitations, three hours, and laboratory, three hours, per week. Fee, \$5.00.

3. Research Work in Soil Physics. Experimentation and study of special problems relating to the physical characteristics of soils and their relation to crop production. Experiments may be carried on in the laboratory, greenhouse, or field. Modern laboratory and greenhouse facilities offer to the student an excellent opportunity for research work from the standpoint of Soil Physics. A wide range of special subjects is afforded the student. This course offers special advantages for a study of the physical composition of soils. Prerequisite, Soils 1. Two hours' credit. Laboratory, six hours per week. Fee, \$2.00.

4. Research Work in Soil Fertility. Experimentation and study of special problems relating to maintaining and increasing the productive capacity of soils. This course is designed to enable the student to study one or more types of soil in which he may be specially interested, and also to study the effect of certain systems of soil management upon the plant food content and productive capacity of soils. This course offers special advantages for pot culture investigations and for a study of the chemical composition of soils. Prerequisites, Soils 1 and 2. Two hours' credit. Laboratory, six hours per week. Fee, \$2.00.

6. Advanced Soil Fertility. This course includes a study of the plant food content and productiveness of particular types or classes of soils; the relation of the plant and soil, such as the influence of acidity and alkalinity, and also the influence of root excretions and of organic materials; the effect of fertilizing materials upon the growth, yield and quality of various crops as determined by pot culture and field experiments; methods of conducting fertility investigations and presenting data. Lectures will be given and the students will make a careful study of the fertility investigations which have been made by the Experiment Stations of this and other countries. Special emphasis will be placed upon the data from these investigations which tend to establish practical systems of soil management. This course is also intended for the student who desires to study the methods of experimentation which are employed by leading investigators along soil fertility lines. Prerequisites, Soils, 1 and 2. Two hours' credit. Lectures and recitations, two hours per week. Fee, \$1.00.

7. Investigation of Special Soils. This work includes a study of the soil investigations which have been made at the Rothamsted Experiment Station with special reference to the effect of different systems of soil management upon the productive capacity of the soil. This course affords the student an opportunity to study and discuss the great mass of data which has been collected during a period of

more than half a century at the most famous experiment station in the world. Prerequisites, Soils, 1 and 2. One hour credit. Lectures and recitations, one hour per week. Fee, \$1.00.

8. **Soil Bacteriology.** A study of the bacterial flora of some of the principal soil types of the state, including the determination of the number and distribution of bacteria in the soil, their isolation, and a study of the morphological, physiological and cultural characteristics of some of the more important species. The work also comprises a study of the decomposition of nitrogenous and carbonaceous matter, nitrification, denitrification, the assimilation of free atmospheric nitrogen, and methods for testing the nitrifying, denitrifying and nitrogen fixing properties of soils. The course is intended to cover the inter-relationships existing between bacteria and the soil, and thus indirectly between bacteria and the growth of higher plants. Prerequisites, organic chemistry and general bacteriology. Three hours' credit. Lecture, one hour, and laboratory, six hours, per week. Fee, \$4.00.

11. **Thesis.** Must be upon some subject requiring original investigation in Soils. Three hours' credit.

12. **Thesis.** Same as Soils 11, except that it is five hours' credit.

13. **Soil Surveying and Mapping.** This course includes a further study of the physical properties of Soils and their physical composition as determined by mechanical analysis. The preparation of large scale plane table maps of selected areas and a detailed survey of the soils. Also a study of the relation of topography and the physical and chemical composition of soils to the character and growth of the native vegetation. The principles underlying the adaptability of particular soils to different kinds of forest and fruit trees, and to various farm and garden crops. Prerequisite, Soils 1. One and two-thirds hours' credit. Lectures and recitations, one hour, and laboratory, two hours, per week. Fee, \$2.00.

14. **Advanced Soil Bacteriology.** A continuation of the work given in Soils 8 and the consideration of some additional problems, including a study of the transformation of the mineral constituents of the soil, soil inoculation, cellulose fermentation, effect of cultural conditions on the bacterial flora of the soil, and bacteria in barnyard manures with special reference to the conservation of the manurial constituents. Prerequisite, Soils 8. Three hours' credit. Lecture or reports on assigned reading, one hour, and laboratory, six hours, per week. Fee, \$4.00.

15. **Advanced Laboratory Work in Soil Physics.** A study of the physical composition of soils by mechanical analysis and petrological examination; the determination of the temperature, moisture, and soluble salt content of various soils under field conditions, including methods of testing for alkali soils. Greenhouse, laboratory and field experiments are conducted to determine the effect upon soil conditions

of different methods of soil management; the work also includes assigned readings, study of results of previous investigations, and written reports of results of experiments and investigations made by the student. Prerequisite, Soils 1. Two hours' credit. Laboratory, six hours per week. Fee, \$2.00.

16. **Advanced Laboratory Work in Soil Fertility.** A detailed study of the chemical composition of soils, the analysis of typical soils of the state, or any particular locality, with special reference to the determination of humus, nitrogen, phosphorus, potassium and lime. Physiological soil analysis by the paraffin wire basket method and larger pot cultures, and by the growing of plants in aqueous extracts of soils. The work also includes assigned readings, study of results of previous investigations, and written reports of results of experiments and investigations made by the student. Prerequisite, Soils 2. Two hours' credit. Laboratory, six hours per week. Fee, \$2.00.

17. **Soils Seminar.** One hour credit. The Juniors and Seniors in Soils and Farm Crops hold a joint seminar each two weeks while college is in session. At each meeting papers, prepared by students, are presented and topics of special interest to Agronomy students are discussed.

18. **Soils Seminar.** A continuation of Course 17. One hour credit.

Department of Dairying

MARTIN MORTENSEN, ASSOCIATE PROFESSOR.

GILBERT T. GUTHRIE, ASSISTANT PROFESSOR.

JOHN HAROLD GORDON, ASSISTANT PROFESSOR IN DAIRY BACTERIOLOGY.

FRANK LEWIS ODELL, INSTRUCTOR.

ADDISON HERBERT CHADSEY, INSTRUCTOR.

E. S. ESTEL, STUDENT ASSISTANT.

HAROLD FREDERICK LUICK, EXTENSION WORK.

CHARLES C. R. BUSH, EXTENSION WORK.

Owing to the rapid progress and the application of scientific principles to the dairy industry, it is necessary that those engaged in this work should keep in touch with new ideas and principles. In order to meet this demand, the dairy department offers, first, a four-year course for qualifying students to become competent teachers and investigators of dairying in agricultural colleges and experiment stations, inspectors of dairy products and creameries in municipal, state and government service, or superintendents of large creameries or dairy farms; second, one-year course, for fitting students for becoming operators of creameries, cheese factories, and dairy farms; third, a two-weeks' short



DAIRY BUILDING.



THE CHURN ROOM.

course, for acquainting experienced dairy and creamery men with new methods and investigations which they cannot learn in their own factories; and fourth, a one-week's course for creamery managers and secretaries.

The Dairy Department offers unexcelled facilities for teaching dairying in a thoroughly practical and scientific manner. The dairy farm of 200 acres is well stocked with various types and breeds of milk cows. The milk from this herd, together with the milk and cream shipped and hauled to the college, supplies all the needs of the creamery.

The Dairy Building erected at a cost of about \$75,000 is a practical working creamery, and cheese and ice-cream factory, and is considered by authorities to be one of the most practical and complete dairy buildings in existence.

COURSE IN DAIRYING.

For Freshman year, see Agricultural Course, page 23.

Sophomore Year.

THIRD SEMESTER.

		Required Semester Hours.
Agricultural Engineering 7,	Dairy Engineering	1½
Animal Husbandry 3,	Breed Types of Cattle and Sheep	3½
Horticulture 3,	Orcharding	2½
Agricultural Chemistry 21,	Elementary Experimental Chem- istry	5
English 12,	Argumentation	2
Economic Science 9,	Outlines of Economics	3
Public Speaking 10,	Extempore Speech	2
Military 3, or Athletics		—
Total semester hours		19½

FOURTH SEMESTER.

		Required Semester Hours.
Dairying 11,	Cheese Making	3
Dairying 13,	Milk Testing and Milk Inspection	1½
Animal Husbandry 4,	Breed Types of Dairy Cattle, Horses and Swine	3½
Agricultural Chemistry 23,	Elementary Experimental Chem- istry	5
Choice {	Economic Science 10,	3
	History 6,	
	Agricultural Economics 3 French Revolution and XIX Century 3	

Public Speaking 11,	Extempore Speech	2
Military 4, or Athletics		—
	Total semester hours	18

Junior Year.**FIFTH SEMESTER.**

		Required Semester Hours.
Dairying 14,	Advanced Butter Making	3½
Animal Husbandry 21,	Principles of Breeding	2
Agricultural Chemistry 25,	Agricultural Analysis	4
Botany 25,	Microscopical Examination of Foods	2
Dairying 26,	Judging Dairy Products	1
		—
		12½
Electives will be selected from the list on page 80,		3¾ to 7¾
		—
	Total semester hours	16 to 20

SIXTH SEMESTER.

		Required Semester Hours.
Dairying 16,	Technology of Milk	1
Dairying 24,	Fancy Cheese Making	2½
Bacteriology 1,	General Bacteriology	4
Agricultural Chemistry 26,	Agricultural Analysis	4
Dairying 27,	Butter Judging	1
		—
		12½
Electives will be selected from the list on page 80,		3¾ to 7¾
		—
	Total semester hours	16 to 20

Senior Year.**SEVENTH SEMESTER.**

		Required Semester Hours.
Dairying 17,	Dairy Bacteriology	4
Dairying 19,	Seminar Work	2
Agricultural Chemistry 40,	Dairy Chemistry	4
Animal Husbandry 20,	Animal Feeding	2
Veterinary 44,	Sanitary Science	2
Dairying 28,	Advanced Butter Judging	1
		—
		15
Electives will be selected from the list on page 80,		1 to 5
		—
	Total semester hours	16 to 20

EIGHTH SEMESTER.

		Required Semester Hours.
Dairying 20,	Factory Management	3½
Dairying 21,	Preparation of Ice-Cream and Ices	1½
Dairy 23,	Thesis	2
Animal Husbandry 15,	Milk Production	1
		—
		8
Electives will be selected from the list on page 80,		8 to 12
		—
	Total semester hours	16 to 20

ONE-YEAR COURSE IN DAIRYING.

The one-year course in dairying is designed to meet the needs of those who want to acquire a knowledge of practical dairy methods. This course includes one college year beginning in August and ending in June. Students completing this course will be given certificates when evidence is furnished that they have successfully for one year operated a creamery or other dairy establishment.

FIRST SEMESTER.

Dairying 1,	Dairy Practice	6
Dairying 2,	Buttermaking	1
Dairying 3,	Milk Testing	1
Agricultural Engineering 7,	Dairy Engineering	1½
Animal Husbandry 19,	Feeding Dairy Stock	2
Chemistry 28,	Dairy Chemistry	1
Dairying 6,	Dairy Bacteriology	1
		—
	Total semester hours	13½

SECOND SEMESTER.

Dairying 26,	Judging Dairy Products	1
Dairying 1,	Dairy Practice	6
Dairying 8,	Cheese Making	1
Dairying 5,	Bookkeeping	1
Dairying 20,	Factory Management	3½
Animal Husbandry 18,	Breeding and Judging Dairy Stock	2
Dairying 21,	Preparation of Ice Cream and Ices	1½
Chemistry 29,	Dairy Chemistry	2
		—
	Total semester hours	18

COURSES IN DAIRYING.

* 1. **Dairy Practice.** Includes practical work in buttermaking, cheesemaking, ice-cream making, and care of the boiler and ice machine. Five to seven hours' laboratory work per day. Six hours' credit.

2. **Buttermaking.** Includes a study of the composition of milk and dairy products, the principles of gravity and centrifugal separation of cream, cream ripening, preparation of starters, churning, and preparation of butter for market. One hour credit.

3. **Milk Testing.** A study of the Babcock test, and of the Farrington and Manns' test for determining acidity, the use of the lactometer for detecting adulterations, and also the composite sampling and testing of individual cows. One hour credit.

5. **Bookkeeping.** Study of the best form of bookkeeping for the factory business. One hour credit.

6. **Dairy Bacteriology.** Application of the principles of bacteriology in the care of milk, and in butter and cheesemaking. One lecture per week.

8. **Cheesemaking.** Includes a study of the principles and practices involved in the manufacture of Cheddar cheese. One hour credit.

For courses one, two, three and eight, all of which are offered in the one year Dairy Course, a fee of \$10.00 per semester is charged.

10. **Domestic Dairying.** Study of those dairy subjects that interest the housekeeper and dietetist. The important topics are: The nutritive and economic value of milk; its dietetics and hygiene; market milk, infants' milk, invalids' milk, cream, ice cream, condensed milk, milk chocolates, malted milk, dried milk, fermented milks (Kephir, Koumissete), buttermilk, butter, and cheese. Demonstrations are given in types of butter and cheese and in testing the purity of milk and butter. Two lectures per week. Fee, \$2.00.

11. **Cheesemaking.** A study of the importance of the quality and composition of milk in the manufacture of Cheddar cheese; the principles involved in cutting, heating, milling, salting and pressing the curd, curing and marketing; influence of organized and unorganized ferments in cheese; and the construction and ventilation of cheese curing rooms. Three hours' credit. Recitation, one hour and laboratory, six hours, per week. Fee, \$3.00.

12. **Farm Dairying.** Includes a general study of the secretion, composition, testing, separation and acidity of milk, preparation of starters, ripening of cream, and churning and packing butter. Two and two-thirds hours' credit. Recitation, two hours, and laboratory two hours, per week. Fee, \$3.00.

13. **Milk Testing and Milk Inspection.** A study of the Babcock test, Farrington's and Manns' test for determining acidity, the use of

the lactometer for detecting adulteration, composite sampling, and testing of individual cows, and detection of different preservatives and adulterations. One and two-thirds hours' credit. Recitation, one hour, and laboratory, two hours, per week. Fee, \$2.50.

14. Advanced Buttermaking. A study of the physical and chemical properties, secretion and composition; separation of milk, cream ripening, the principles of churning, packing and marketing butter. Prerequisite, Agricultural Chemistry 21. Three and one-third hours' credit. Recitations, two hours, and laboratory, four hours, per week. Fee, \$3.00.

16. Technology of Milk. A study of the utilization of milk and its products, as the preparation of condensed, modified, and milk sugar, casein, and the food value of milk and its products. Prerequisite, Agricultural Chemistry 25. Recitation, one hour per week. Fee, 50 cents.

17. Dairy Bacteriology. A study of bacteria in milk and its products; their sources, mode of entry and subsequent changes produced; the production and handling of milk from a hygienic and economic view-point and its relation to the public health. Prerequisites, Bacteriology 1, and Chemistry 26. Four hours' credit. Lectures, two hours, and laboratory, six hours, per week. Fee, \$4.00.

19. Seminar Work. A study of various authorities on Dairying together with the work of the experiment stations on this subject. Prerequisites, Bacteriology 1, Dairying 11 and 14. A knowledge of French and German is recommended. Two hours per week.

20. Factory Management. Consists of the location, organization, construction, drainage, and ventilation of factories, the treatment of the by-products, and creamery refrigeration, thus qualifying a student to superintend or manage a large factory or dairy establishment. It is advisable for students to put in the laboratory during vacation or when work can be done during consecutive days. Prerequisite, Dairy 14 and 28. Three and one-third hours' credit. Lecture, two hours, and laboratory, four hours, per week.

21. Preparation of Ice-Cream and Ices. A study of the preparation of ice-cream, sherbets, and ices, made on a private or commercial scale. Both lectures and laboratory. One and two-thirds hours' credit. One recitation and one two hour laboratory. Fee, \$3.00.

23. Thesis. Original work on some dairy subject. May be worked out in co-operation with the departments of chemistry or bacteriology. Students should consult the professor concerning their subject at the beginning of their Senior year. Two hours per week.

24. Fancy Cheesemaking. Includes making the varieties found in the American market as Limburger, Swiss, Brick, Roquefort, Sage, Stilton, Pineapple, Gouda, Gorgonzola, and Neufchâtel. Two and one-third hours' credit. Lecture, one hour, and laboratory, four hours, per week. Fee, \$3.00.

25. **Advanced Dairy Bacteriology.** Laboratory investigation of bacteriological problems relating to dairying, the nature of the work being adapted largely to the individual student. Prerequisite, Dairy 17. Credit, three hours.

26. **Judging Dairy Products.** Includes the judging of butter, milk and cream, ice-cream, sherbet, and the various kinds of cheeses, paying special attention to score cards. Prerequisite, Dairying 13. One hour credit. Fee, \$3.00.

27. **Butter Judging.** A study of standard market requirements. Includes more advanced work in scoring butter. Prerequisites, Dairying 14 and 26. One hour credit. Fee, \$3.00.

28. **Advanced Butter Judging.** This course is intended to qualify a student to fill the position of an official judge. One hour credit. Fee, \$3.00.

Department of Animal Husbandry

WILLARD JOHN KENNEDY, PROFESSOR.

WAYNE DINSMORE, ASSOCIATE PROFESSOR.

HOWARD CASTNER PIERCE, ASSISTANT PROFESSOR, POULTRY.

EDWARD NORRIS WENTWORTH, ASSISTANT PROFESSOR.

WILLIAM HARPER PEW, ASSISTANT PROFESSOR.

ARCHIBALD LEITCH, ASSISTANT PROFESSOR, SUPT. OF DAIRY FARM.

WILLIAM A. LIPPINCOTT, STUDENT ASSISTANT, POULTRY.

B. F. MILLER, GRADUATE ASSISTANT.

RALPH K. BLISS, EXTENSION WORK.

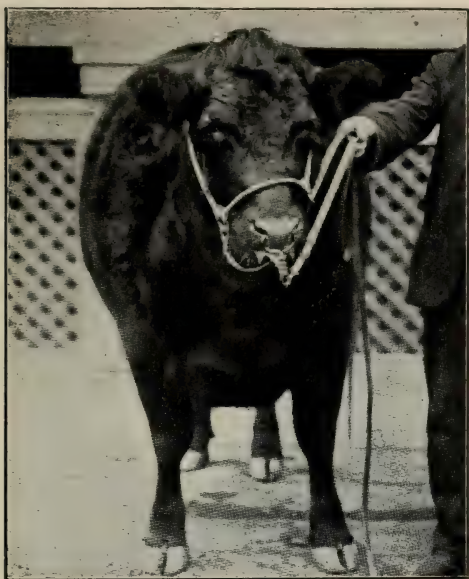
HAROLD FREDERICK LUICK, EXTENSION WORK.

CHARLES C. R. BUSH, EXTENSION WORK.

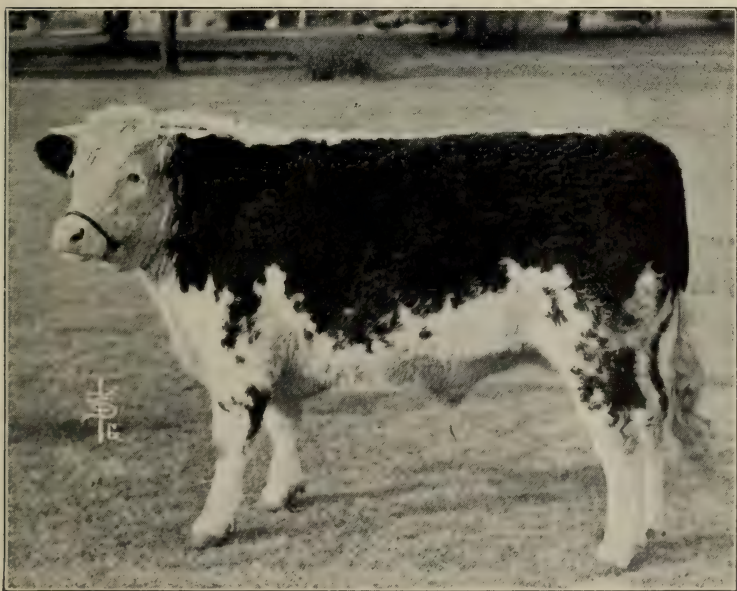
LESLIE EUGENE TROEGER, EXTENSION WORK.

The department of Animal Husbandry stands for all lines of work which pertain to the judging, selecting, breeding, feeding, development, care, and management of the various breeds and classes of domesticated animals. Because of the importance of the live stock industry to the welfare of the state, and because of the demand for instruction in this line, the equipment for instruction has been made as complete in every detail as possible.

The herds and flocks, established at an early date, have been added to from time to time until our equipment in this line, consisting of almost all recognized breeds of animals, places us in a position to do



BLACK ROCK—INTERNATIONAL GRAND CHAMPION OF 1905.



DEFENDER—INTERNATIONAL GRAND CHAMPION OF 1906.

work in Animal Husbandry lines which cannot be accomplished in those institutions where such specimens are not furnished for instruction. Believing that training the eye is the only way to make a young man a proficient judge of live stock, the work of the lecture room and laboratory is demonstrated by the use of living specimens.

The two commodious judging pavilions, located near the barn, afford ample room for dividing the classes into many sections, thus allowing individual work.

An excellent collection of horses representing all the market classes and the breeds of both light and heavy types is maintained for instruction purposes. Among these are good representatives of the Shires, Percherons, Clydesdales, French Coachers, Hackneys, Standard breds, and American Saddle Horses. Some of the horses are imported; while the others have been purchased, with much care in their selection, from the best breeders on the continent.

More than 200 head of cattle, representing all the leading beef, dual-purpose, and dairy breeds are maintained on the farm. Complete breeding herds of most of the breeds are kept. An excellent collection of steers, representing the highest type of fat steer, and all the other classes and grades to be found in our leading markets down to the very lowest grades, is always available for class work. This affords our students an excellent opportunity to study the market demands and to know what constitutes each class, also why there is such a wide margin in the prices paid for cattle by the packer.

The dairy farm is well stocked with dairy cattle, including a herd of about a hundred representatives of the Holsteins, Jerseys, Guernseys, Ayrshires, milking Short-horns, with good sires of the different breeds. This equipment affords an excellent opportunity for class work when studying the origin, history, and development of the different breeds of dairy cattle, their characteristics and the conditions under which they are evolved; also for carrying on investigations along the lines of breeding, feeding and management of the dairy herd for profit; and the relative values of home-grown feedstuffs and by-products in the production of milk and butter fat.

The flock of sheep, consisting of over 200 head of seven different breeds, have been carefully selected to represent the type and characteristic of each breed, both in regard to form and wool-bearing qualities. In addition to the breeding flocks, the department has a choice collection of fat wethers which affords an opportunity for the student to familiarize himself with the highest type of finished mutton sheep. All these are available for class work.

In the swine department, representatives of six breeds of the best American and British varieties are maintained. As in the other departments, the aim in this has been to keep in touch with the modern ideas of leading breeders, both in regard to breeding and the type of the animals in these breeds.

At all seasons of the year there is more or less feeding of market stock being done on the farm and in connection with the Experiment Station, so that excellent material is always available for instruction purposes regarding the qualities that add to the value of stock for the ordinary market. Having pure-bred representatives, it is easy to inform the student in a practical way on the finer points of color, type, and other characteristics that relate to the pure-bred classes of stock.

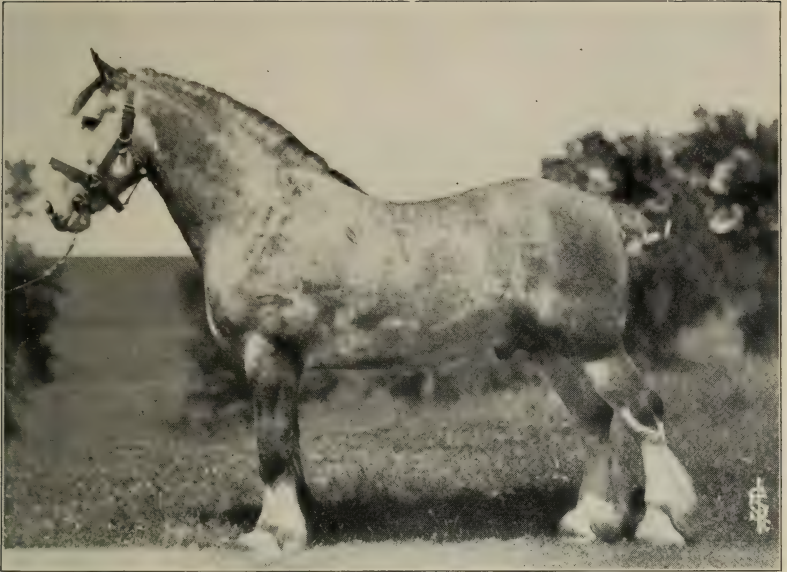
To assist further in this work, the herd books of the different American and foreign registry associations are being constantly added to the library. The College possesses the most complete set of the English Short-horn herd books in existence in America. Through herd book study, the student is enabled not only to inform himself in regard to pedigrees, but he is enabled also to study the different scales of points which the breeders have adopted to represent the highest types of the various breeds.

The department is also equipped with photographs, charts, and lantern slides which are used in the lecture room when it is impossible to illustrate with the living animal. The abundant material available from the herds and flocks is used extensively in all lectures and score card practice. By means of score cards prepared by the department, the students are brought in close contact with the animals, and through them are informed on the points of market merit desirable in ordinary stock, while later the use of the official scale of points for the different breeds in a similar way makes them skilful in judging representatives of different breeds.

As soon as the student is familiar with the use of the score card, comparative judging is introduced. In comparative judging from four to six animals are used, and each student is required to place all the animals in order of merit, and write down clearly and concisely on a blank folder, prepared especially for this work, full reasons for making his awards. This kind of work teaches the student to compare animals and to balance the weak and the strong points of each in making his final awards. As soon as the student demonstrates his ability to place classes well, herd groups and sweepstake classes are introduced during his Senior year's work. This kind of work is similar to the most difficult judging done at our leading state fairs and international expositions. As soon as the student shows that he possesses the qualifications needed to judge stock in the show ring, he is sent out, in answer to the many requests from the secretaries, to judge various classes of stock at county fairs. This, in connection with his college work, results in establishing the lessons learned in the class room.

Positions Open for Men Trained Along Animal Husbandry Lines.

There is a great demand for competent young men trained along the lines of practical and scientific Animal Husbandry work, men who



INTERNATIONAL WINNERS USED IN GOVERNMENT HORSE BREED-
ING WORK AT AMES.

combine their college training with practical experience and native ability. Such is the training offered to the young men in this course. The demand for such students is unlimited at a compensation not exceeded in any other calling. A few of the many lines of work open to graduates of this department are: College and experiment station work, agricultural journalism, managers of stock farms, salesmen with commission merchants, buyers for the packing houses at the many stockyard centers, and salesmen of animal feedstuffs manufactured by the packing houses, glucose companies, linseed and cottonseed oil companies.

Clay, Robinson & Co. Fellowship Prizes.

Clay, Robinson & Co., Live Stock Commission Merchants, Union Stock Yards, Chicago, offer annually \$1,000.00 in prizes to be awarded to the Agricultural Colleges making the best exhibit of live stock at the International Live Stock Exposition held at Chicago in December of each year. They stipulate that the money won by the various colleges shall be used for the establishment of fellowship prizes to be awarded to graduate students in the department of Animal Husbandry. These fellowships, amounting to \$250.00 per student annually, are granted by the Board of Trustees upon the recommendation of the dean of the Division of Agriculture and the head of the department. A student holding a fellowship may pursue graduate work in Animal Husbandry.

WINTER COURSE IN STOCK JUDGING.

(January 2, 1911, to January 14, 1911.)

In response to a widespread demand for special short course instruction in the judging and feeding of animals, a two weeks' course has been established during the winter vacation. This course will begin January 2, 1911, and continue for two weeks. It will be devoted exclusively to score card practice, and judging of horses, cattle, sheep, and hogs, and lectures on feeding the same.

In this work special attention will be given to the selection of animals best suited for feeding purposes. Good specimens of the highest type of fat steers and ideal representatives of all the various breeds will be used for class work. At the conclusion of the cattle work a slaughter test and block demonstration of the various market types of steers will be conducted under the supervision of John Gosling, Kansas City, Missouri. This course is intended especially for the man on the farm that cannot avail himself of the opportunity to take a complete course.

A special course in corn judging will be given at the same time and the work will be so arranged that all those present may take both lines of work.

To cover in part the expense of procuring additional help and stock for demonstration, a tuition fee of \$3.00 for residents and \$5.00

for non-residents will be charged for admission to this course, but one fee will cover the instruction in both grain and stock judging.

COURSE IN ANIMAL HUSBANDRY.

For Freshman year, see Agricultural Course, Page 23.

Sophomore Year.

THIRD SEMESTER.

		Required Semester Hours.
Animal Husbandry 3,	Breed Types of Cattle and Sheep	3½
Agricultural Engineering 4,	Farm Engineering	3½
Zoology 2,	General Zoology	5
Agricultural Chemistry 21,	Elementary Experimental Chem- istry	5
Horticulture 3,	Orcharding	2½
Military 3, or Athletics		
Total semester hours		19½

FOURTH SEMESTER.

		Required Semester Hours.
Animal Husbandry 4,	Breed Types of Dairy Cattle, Horses and Swine	3½
Agricultural Engineering 5,	Farm Machinery and Farm Motors	2½
Zoology 3,	General Zoology	5
Agricultural Chemistry 23,	Elementary Experimental Chem- istry	5
Botany 26,	Ecology	2
English 12,	Argumentation	2
Military 4, or Athletics.		
Total semester hours		20

Junior Year.

FIFTH SEMESTER.

		Required Semester Hours.
Animal Husbandry 11,	Feeding and Management of Live Stock	2
Animal Husbandry 31,	Poultry Management	2½
Agricultural Chemistry 25,	Agricultural Analysis	4
Soils 1,	Soil Physics	4
Zoology 5,	Embryology	3
Veterinary 23,	Comparative Physiology	2
Animal Husbandry 22,	Seminar	½

This course must be continued through the year. Final

standing will not be certified to recorder until the close of the sixth semester.

Electives will be selected from the list on page 80, $18\frac{1}{2}$
 0 to $1\frac{5}{6}$

Total semester hours $18\frac{1}{2}$ to 20

SIXTH SEMESTER.

		Required Semester Hours.
Animal Husbandry 8,	Animal Breeding	2
Animal Husbandry 12,	Feeding and Management of Live Stock	2
Animal Husbandry 37,	Poultry Management	$2\frac{3}{4}$
Soils 2,	Soil Fertility	4
Zoology 8,	Animal Parasites	2
Agricultural Chemistry 26,	Agricultural Analysis	4
Animal Husbandry 22,	Seminar	$\frac{1}{2}$

A continuation of work in fifth semester. Standing will be for fifth and sixth semester. One hour credit for both semesters' work will be recorded at end of sixth semester.

Electives will be selected from the list on page 80, $17\frac{1}{2}$
 0 to $2\frac{5}{6}$

Total semester hours $17\frac{1}{2}$ to 20

Senior Year.

SEVENTH SEMESTER.

		Required Semester Hours.
Animal Husbandry 6,	Advanced Live Stock Judging	$1\frac{1}{2}$
Animal Husbandry 9,	Animal Nutrition and Packing House By-Products	2
Veterinary 19,	Obstetrics	1
Veterinary 44,	Sanitary Science	2
Veterinary 55,	Anatomy of Domestic Animals	$1\frac{1}{2}$
Animal Husbandry 23,	Seminar	$\frac{1}{2}$

This course must be continued through the year. Final standing will not be certified to the recorder until close of the eighth semester.

Electives will be selected from the list on page 80, $8\frac{1}{2}$
 7 $\frac{5}{6}$ to $11\frac{5}{6}$

Total semester hours 16 to 20

EIGHTH SEMESTER.

		Required Semester Hours.
Animal Husbandry 7,	Herd Book Study	2

Animal Husbandry 10,	Thesis	2
Animal Husbandry 13,	Advanced Work in Beef Production	1
Animal Husbandry 14,	Advanced Work in Pork Production	1
Animal Husbandry 15,	Milk Production	1
Animal Husbandry 16,	Advanced Work in Mutton and Wool Production	1
Animal Husbandry 17,	Advanced Work in Horse Feeding	1
Animal Husbandry 23,	Seminar	1½

A continuation of work in the seventh semester. Standing will be for seventh and eighth semesters. One hour credit for both semesters' work will be recorded at close of eighth semester.

Veterinary 16,	Horse Shoeing	2
Veterinary 18,	Conformation and Soundness	2
Zoology 6,	Evolution of Animals	1

14½

Electives will be selected from the list on page 80, 1½ to 5½

Total semester hours 16 to 20

COURSES IN ANIMAL HUSBANDRY.

1. **Market Types of Cattle and Sheep.** Includes the judging of different market classes of cattle, both beef and dual-purpose, and sheep, both mutton and wool. Credit, two hours. Three hours' laboratory and one hour lecture per week. Fee, \$2.00.

2. **Market Types of Dairy Cattle, Horses and Swine.** Includes judging different market classes of dairy cattle, light and heavy horses, and swine, (bacon and fat). Three hours' laboratory and one hour lecture per week. Fee, \$2.00.

3. **Breed Types of Cattle and Sheep.** Includes judging representatives of different breeds according to their official standards, a study of their origin, history, characteristics, and adaptability to different conditions of climate and soil. Prerequisite, Animal Husbandry 1. Three and one-third hours' credit. Lectures, two hours and two 2-hour judging periods per week. Fee, \$2.00.

4. **Breed Types of Dairy Cattle, Horses and Swine.** Includes judging of representatives of different breeds according to their official standards, a study of their origin, history, characteristics, and adaptability to different conditions of climate and soil. Prerequisite, Animal Husbandry 2. Three and one-third hours' credit. Lectures, two hours, and two 2-hour judging periods per week. Fee, \$2.00.



INTERNATIONAL PRIZE WINNERS AT AMES.

6. **Advanced Live Stock Judging.** Includes judging horses, cattle, sheep and swine, especially in groups similar to county and state fair work. Prerequisites, Animal Husbandry 4, and Zoology 3. One and one-third hours' credit. Two 2-hour judging periods per week. Fee, \$2.00.

7. **Herd Book Study.** Includes a study of herd books, with a view to becoming acquainted with the pedigrees of the leading strains and families of the different breeds of live stock. Prerequisite, Animal Husbandry 4. Recitations, two hours per week.

8. **Animal Breeding.** Embraces a study of principles of breeding, including selection, heredity, atavism, variation, fecundity, with the presentation of methods of breeding, in-and-in breeding, cross breeding, etc., and a historical study of their results, also the several features relating to the higher breeding of pure-bred stock. Prerequisites, Animal Husbandry 4, and Zoology 5. Recitations, two hours per week.

9. **Animal Nutrition and Packing House By-Products.** Study of anatomy and physiology of the digestive system, the purpose of nutrition, the theory and practical economy of rations for growth, fattening, milk or maintenance; sanitation of feeds and hygiene of the farm. Prerequisite, Chemistry 25. Recitations, two hours per week.

10. **Thesis.** Must be along some line to be arranged with the head of the department. Two hours' credit.

11. **Feeding and Management of Live Stock.** The practical feeding, care, and management of beef and dairy cattle. Two hours' credit. Lecture, one and one-third hours, and laboratory, two hours, per week. Fee, \$2.00.

12. **Feeding and Management of Live Stock.** The practical feeding, care and management of horses, hogs and sheep. Prerequisite, Animal Husbandry 11. Two hours' credit. Lecture, one and one-third hours, and laboratory, two hours, per week. Fee, \$2.00.

13. **Advanced Work in Beef Production.** A systematic study of the most successful and economical methods of producing beef cattle for market purposes; production of baby beef; advisability of long and short feeding periods; and the feeding of grain rations to cattle on grass. Prerequisites, Animal Husbandry 9, and Zoology 8. One hour credit. Five 1-hour periods per week for first five weeks.

14. **Advanced Work in Pork Production.** A systematic study of most successful and economical methods of growing and finishing pigs of both the lard and bacon types for market purposes. Prerequisites, Animal Husbandry 9, and Zoology 8. One hour credit. Five 1-hour periods per week for second five weeks.

15. **Milk Production.** Study of various feeding stuffs and the methods of preparing and feeding same as related to most successful and economical production of milk. Prerequisite, Animal Husbandry 9. One hour credit. Five 1-hour periods during four weeks, following Animal Husbandry 14.

16. Advanced Work in Mutton and Wool Production. A thorough study of various feeding stuffs as related to economical production of mutton and wool. Prerequisites, Animal Husbandry 9 and Zoology 8. One hour credit. Five 1-hour periods per week following Animal Husbandry 15.

17. Advanced Work in Horse Feeding. A study of most successful and economical methods of growing and developing young animals; most economical and satisfactory rations for horses at light, medium and heavy work; study of the feeding stuffs best adapted to the production of heavy and economical gains on horses which are being fattened for market. Prerequisites, Animal Husbandry 9, and Zoology 8. One hour credit. Five 1-hour periods per week following Animal Husbandry 16.

18. Breeding and Judging Dairy Stock. Judging dairy stock with the score card and by comparative judging; also study of principles, methods and practice of breeding dairy stock and their improvement. Two hours' credit. Lecture, one hour, and laboratory, three hours, per week.

19. Feeding Dairy Stock. Principles of feeding animals for the most economical production, with the composition and use of various feeding materials, feeding of dairy cows, including the influence of various feeding stuffs on the quantity, quality and composition of milk, butter and cheese. Two lectures per week.

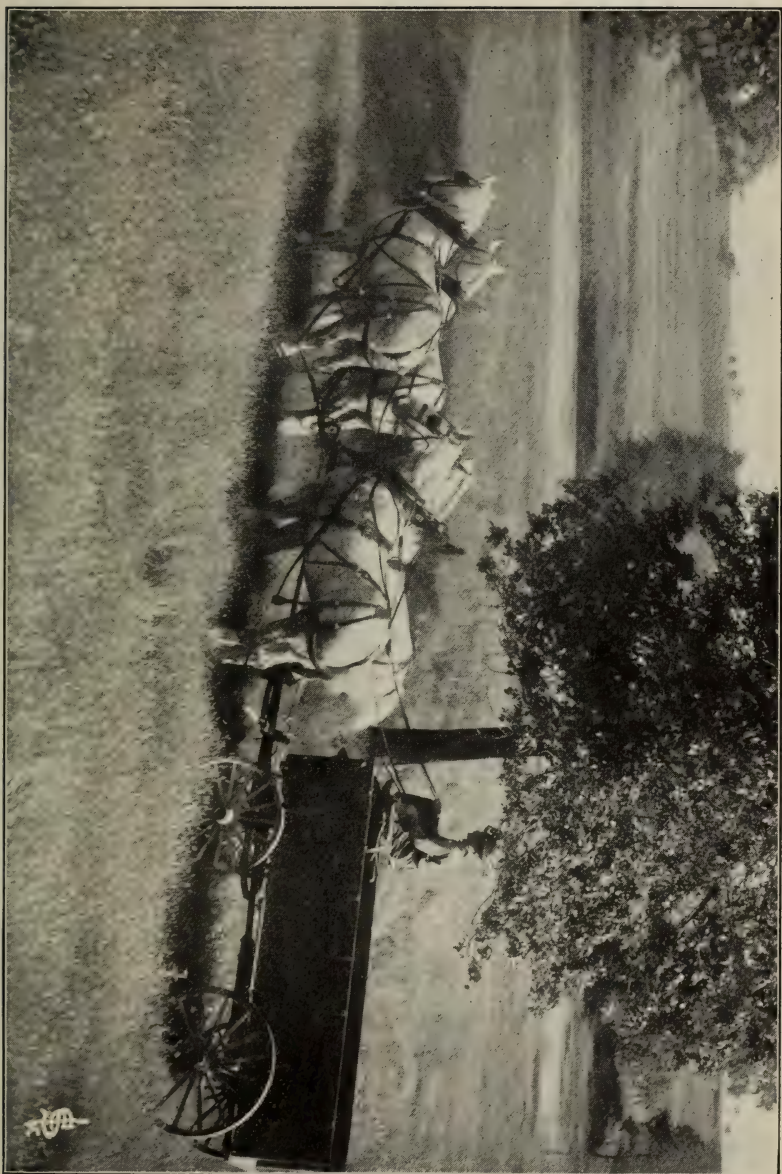
20. Animal Feeding. A study of the composition and digestibility of feeding stuffs; the preparation of coarse fodders; the grinding, steaming and cooking of feeding stuffs; feeding standards and the calculation of rations; feeding for meat, milk, wool, growth and work. Prerequisite, Chemistry 13 or 25. Two hours' credit.

21. Principles of Breeding. An elementary course in breeding offered to meet the demands of those students who have not sufficient foundation to take the regular course in Animal Breeding. Embraces a study of the general principles of breeding, selection, variation, heredity, atavism, etc., and a historical study of the results to date. Prerequisites, Animal Husbandry 1 and 2. Two hours' credit.

22. Animal Husbandry Seminar. One hour credit.

23. Animal Husbandry Seminar. One hour credit.

The Animal Husbandry Seminar Courses 22 and 23 meet once each two weeks while college is in session, and has for its members the professors and instructors in Animal Husbandry, and all students in the Junior and Senior classes in the course in Animal Husbandry. At each meeting, four students—two Seniors and two Juniors—present papers on associated Animal Husbandry topics. These subjects are selected a half year in advance and follow, in regular series, Animal Breeding, Relation of Animal Husbandry to Other Industries, Animal Feeding, and a study of Live Stock Organizations, Expositions, College and Experiment Station Organization and Equipment.



A FARM DRAFT TEAM.

POULTRY HUSBANDRY.

The Poultry Husbandry Department affords opportunities for instruction in all lines of poultry work, such as the selection, care and management, incubating, brooding, judging, breeding, feeding, showing, marketing and diseases of various varieties of fowls, ducks, turkeys and geese.

The Poultry Farm of nearly twenty acres, upon which the buildings have been erected during the last two years, offers unexcelled opportunities for practical instruction. The buildings consist of a large headquarters building, long poultry house, and many colony houses for brooders, young stock, breeding stock, and fattening stock. The Headquarters Building contains a large feed room, carpenter shop, incubator room, killing and marketing room, egg room, and room for attendants; and is without doubt the best building of its kind in the country. The long poultry house, used in laboratory and investigation work, is of the cloth curtain type, and consists of seven 12x12 pens which, together with the colony houses, have a capacity of approximately 1,000 head of poultry. All pens are equipped with trap nests so that individual egg records may be obtained from each hen. The Incubator Room is equipped with machines made by several of the leading incubator firms and affords opportunity for a complete study of the different types of incubators. A thorough study of the latest brooding methods is also made.

POSITIONS OPEN TO MEN TRAINED ALONG POULTRY HUSBANDRY LINES.

At the present time there is an urgent and increasing demand for college men who possess scientific training in Poultry Husbandry, together with practical experience and ability. Some of the openings for students trained along these lines are government, college and experiment station work, managers of utility and fancy poultry farms, poultry journalism and poultry judging, managers of poultry supply houses and poultry fattening establishments, and salesmen with the incubator and brooder manufacturers.

COURSE IN POULTRY HUSBANDRY.

Optional Senior year for Animal Husbandry students.

For Freshman year, see Agricultural Course, Page 23.

For Sophomore and Junior years see Animal Husbandry Course, page 46.

Senior Year.**SEVENTH SEMESTER.**

**Required Semester
Hours.**

Animal Husbandry 9,

Animal Nutrition

2

Animal Husbandry 30,	Poultry Judging	2 $\frac{3}{8}$
Animal Husbandry 32,	Practice in Poultry Feeding and Management	1
Animal Husbandry 35,	Poultry Research and Experimentation	1
Animal Husbandry 38,	Practice in Poultry Fattening	1
Animal Husbandry 41,	Anatomy and Physiology of Poultry	2
Animal Husbandry 40,	Poultry Seminar	$\frac{1}{2}$
Veterinary 44,	Sanitary Science	2
Bacteriology 1,	General Bacteriology	4
Agricultural Journalism 1,		1
		—
		17 $\frac{1}{8}$
Electives will be selected from the list on page 80,	0	to 2 $\frac{5}{8}$

Total semester hours 17 $\frac{1}{8}$ to 20

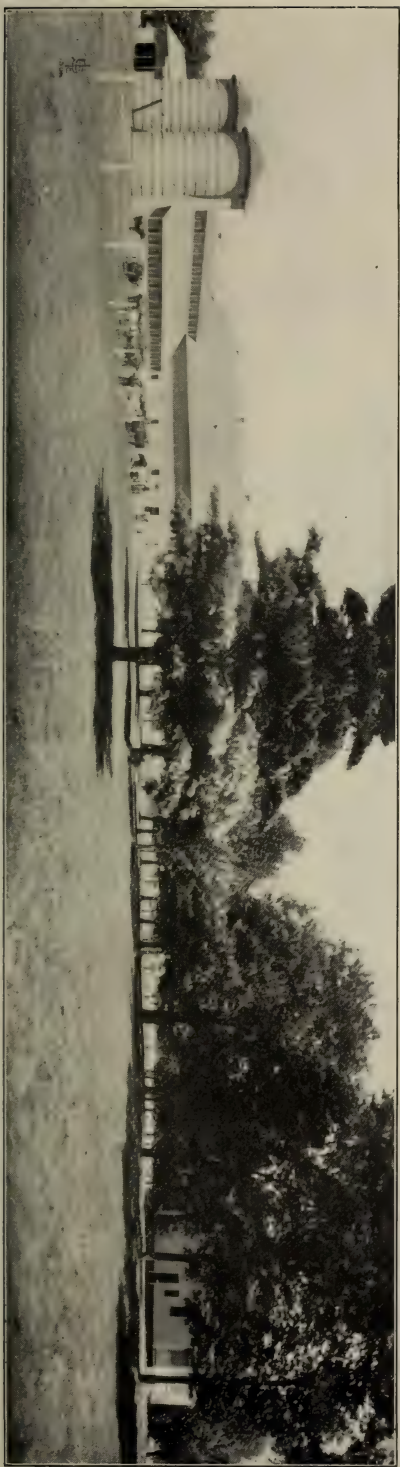
EIGHTH SEMESTER.

		Required Semester Hours.
Animal Husbandry 10,	Thesis	2
Animal Husbandry 33,	Incubator Practice	1
Animal Husbandry 34,	Brooder Practice	1
Animal Husbandry 36,	Poultry Research and Experimentation	1
Animal Husbandry 40,	Poultry Seminar	$\frac{1}{2}$
Animal Husbandry 39,	Advanced Poultry Judging	1
Animal Husbandry 42,	Marketing Poultry Products	2
Veterinary 18,	Conformation and Soundness	2
Economics 9,	Outlines of Economics	3
Zoology 6,	Evolution of Animals	1
Agricultural Journalism 2,		1
		—
		15 $\frac{1}{2}$
Electives will be selected from the list on page 80,	$\frac{1}{2}$	to 4 $\frac{1}{2}$

Total semester hours 16 to 20

COURSES IN POULTRY HUSBANDRY.

30. **Poultry Judging.** This course includes a study of the origins, history, and classification of the various breeds and varieties; and the scoring, judging and breeding of the most important varieties, in accordance with the American Standard of Perfection. Practice will be given in the study of feather markings, judging and fitting of birds for show. Two and two-thirds hours' credit. Lectures, two hours, and one 2-hour laboratory period, per week. Fee, \$2.00.



31. Poultry Management. This includes a study of poultry houses, arrangement of buildings and yards, feeds and feeding, judging for market types, incubation, brooding, anatomy of fowl and egg diseases, sanitation, caponizing, killing, dressing and marketing of poultry products. Two and two-thirds hours' credit. Lectures, two hours, and one 2-hour laboratory period, per week. Fee, \$2.00.

32. Practice in Poultry Feeding and Management. The student will be given charge of a pen of fowls and will be required to keep a record of the amounts and cost of food consumed, gains made, eggs produced and calculate the profit or loss. This work will cover a period of three weeks, and the student must be present morning, noon and afternoon, time to be arranged by appointment with instructor. Prerequisite, Courses 31 and 37. One hour's credit. Fee, \$2.00.

33. Incubator Practice. Each student will be given charge of one or more incubators for the period of one hatch and required to keep the records of fuel consumed, temperatures, infertile eggs, dead germs, dead in shell, chicks hatched, and reckon the cost of incubation. This course will cover a period of four weeks and the student must be present morning, noon and afternoon, time to be arranged by appointment with the instructor in charge. Prerequisites, Courses 31 and 37. One hour credit. Fee, \$2.00.

34. Brooder Practice. Each student will be given charge of chicks in a brooder for four weeks from time of hatching and must keep records of temperatures, fuel and foods consumed, gains made, mortality, and calculate the cost of brooding. The student will be required to be present morning, noon and afternoon, time to be arranged by appointment with instructor. Prerequisites, Courses 31, 33 and 37. One hour credit. Fee, \$2.00.

35 and 36. Poultry Research and Experimentation. This course is intended for those students who wish to fit themselves especially for college and experiment station work in Poultry Husbandry. This course will include a report of special research on some poultry topic, a study of the Poultry Husbandry work now being carried on in the experiment stations throughout the country, methods and technique of breeding for egg production and meat types, arrangement of experimental records and data in feeding, breeding, incubation and brooding. Students electing this course should also take their thesis in Poultry Husbandry. This course extends throughout the year. Time by appointment. Prerequisites, Courses 31 and 37. One hour credit each semester. Fee, \$2.00.

37. Poultry Management. This course continues the work started in Course 31. Two and two-thirds hours' credit. Lecture, two hours, and one 2-hour laboratory period per week. Fee, \$2.00.

38. Practice in Poultry Fattening. Each student will be given charge of and feed several lots of fattening stock, comparing different methods and rations for fattening poultry. Records must be kept

showing the amounts and cost of food fed, amounts and cost of gains in weight, cost per pound of gain, and calculations made of the profit or loss on each lot of stock. This course will cover a period of three weeks and the student must be present morning and evening, time to be arranged by appointment with instructor. Prerequisites, Courses 31 and 37. One hour credit. Fee, \$2.00.

39. **Advanced Poultry Judging.** Practice and study in breeding and judging standard varieties of poultry and instruction in show room management. Lectures and laboratory one 2-hour period per week. Prerequisite, Course 30. One hour credit. Fee, \$2.00.

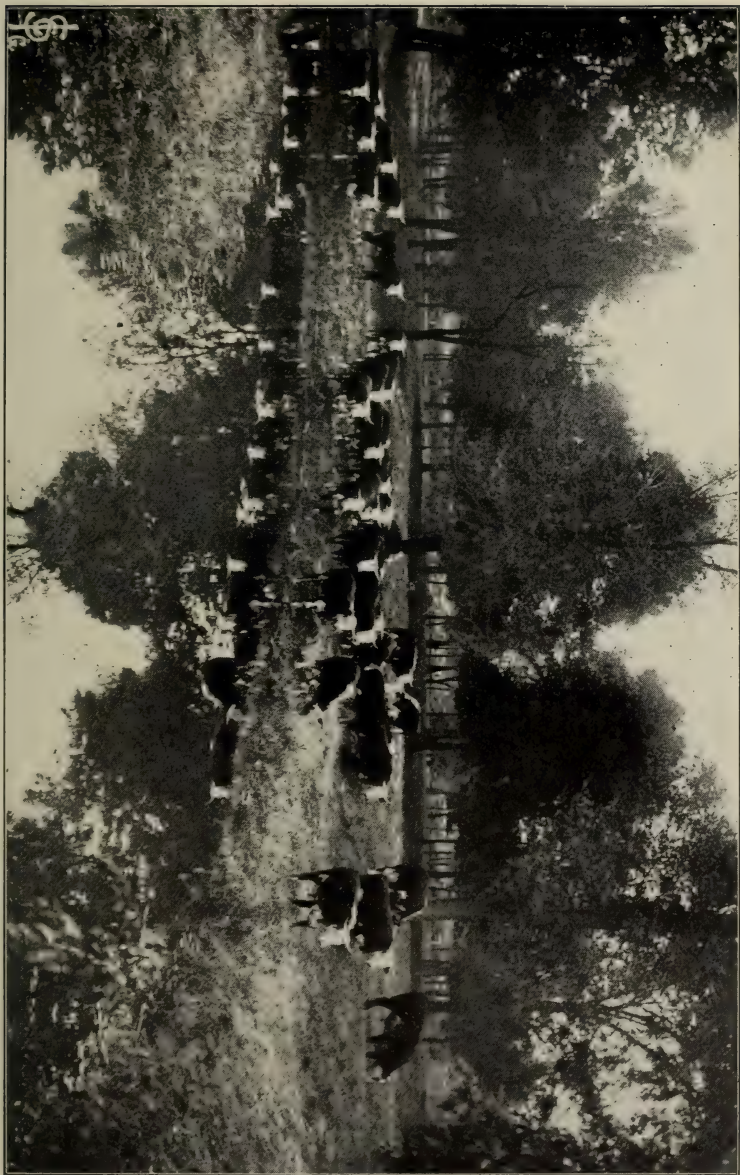
40. **Poultry Seminar.** The poultry seminar meets once every two weeks during the college year. Papers are presented and discussed by members on poultry management, breeding, diseases, poultry organizations, investigations of poultry farms and packing house and other current topics. This course is open only to senior and special students of the Poultry Department. Prerequisites, Courses 31 and 37. Time by arrangement. One hour credit.

41. **Anatomy and Physiology of Poultry.** Includes a study of the comparative anatomy and physiology of various species of poultry, special emphasis being laid upon the forms and functions of the bones, digestive, respiratory and reproductive systems of the common fowl. Lectures one hour per week and forty-eight actual hours of laboratory work near the end of the semester. Prerequisites, Courses 31 and 37, and Veterinary 56 and 23. Two hours' credit. Fee, \$2.00.

42. **Marketing of Poultry Products.** Includes a study of the market classifications of poultry, eggs and feathers, methods of dressing, packing, shipping and selling, requirements of different markets, poultry and egg boards, cold storage of poultry and eggs. Two lectures per week. Prerequisites, Courses 31 and 37. Two hours' credit.

ONE-YEAR POULTRY HUSBANDRY COURSE.

This course is intended for those students who wish to prepare themselves for practical poultry work and have but one year to devote to study and practice. The course will consist of Courses 30 to 34 and 37 to 42, inclusive, practical work on the Poultry Farm, and such work in Animal Husbandry, Horticulture or other departments as may be best adapted to each individual student. The practical work will consist of five to eight hours of work per day in the caring for poultry, building of colony houses, running incubators and brooders, killing and dressing, mixing of feeds, and such other work as is ordinarily done on a poultry farm. This gives the student a chance to acquire that skill which comes only from practice.



PASTURE SCENE ON THE COLLEGE FARM.

Department of Horticulture and Forestry.

SPENCER AMBROSE BEACH, PROFESSOR.

ARTHUR THOMAS ERWIN, ASSOCIATE PROFESSOR, HORTICULTURE.

CHARLES ANDERSON SCOTT, ASSOCIATE PROFESSOR, FORESTRY.

ROGER SHERMAN MACINTOSH, INSTRUCTOR.

GEORGE RAYMOND BLISS, EXTENSION WORK.

JOHN REARDON, GARDENER.

The department of Horticulture and Forestry, with its orchards, plantations of small fruits and vegetables, forest garden, forest area, pomological and forestal museums, greenhouses, laboratories and library, affords excellent opportunities for instruction and research.

A large part of the library of the Department is kept in its offices in the Hall of Agriculture where it is available to students specializing in this line of work. Besides a fairly complete collection of publications pertaining to horticulture and forestry and files of numerous periodicals, it also includes the complete library of Charles Downing containing his original drawings and manuscripts and many rare and valuable works on horticulture and forestry.

About 100 acres of land are now available for horticultural and forestal purposes including a recently added tract of sixty acres on which orchards and forest plantations are being developed. Besides this the campus of more than 100 acres affords opportunities for instruction concerning ornamental trees and plants and landscape design.

Orchard trees ranging in age from one to more than twenty years represent the hardiest types of cultivated fruits both native and foreign and include over a thousand varieties. Several thousand seedling varieties which have been originated in the work in plant breeding are being tested in the orchards and nurseries. Various methods of stratification, layering, budding, grafting and other operations with plants are given practical illustration in the greenhouses and nurseries. Leading types of vegetables are grown to afford opportunity for study in this line of work.

The past few years have witnessed a wonderful development in the science of Forestry due in large part to the increasing scarcity of timber so necessary in the development of every state and community. Large manufacturers and lumbermen are turning to practical forestry as a means of insuring the permanency of their industries. This is causing an increasing demand for trained men to manage our existing forests, provide for future crops, and reclaim barren non-agricultural lands by tree planting. The Government Forest Service calls for a number of college graduates each year and trains them in scientific forestry work. To meet these numerous demands for men, several

colleges and universities, including this one, are giving courses of instruction in Forestry.

The questions that are of greatest importance in the development of forestry in Iowa are the formation, care and harvesting of the farm grove and woodlot and the prevention of stream erosion by tree planting, hence special attention is paid to these problems. Although Iowa is classed as a prairie state, yet there excellent opportunities for the practical study of forestry in many parts of the state. There are several planted groves and considerable timber upon and near the college campus.

The museum of the department contains a large collection of woods native to this country, tropical America and the Philippine Islands. This affords the student ample opportunity for becoming acquainted with the structure and gross appearance of the principal commercial timbers on the markets of this country.

HORTICULTURE AND FORESTRY IN WINTER SHORT COURSE.

(January 2 to January 14, 1911.)

The Department of Horticulture and Forestry offers work during the winter short course which is designed especially to meet the needs of men who have not the opportunity to take a complete course. Instruction is given in up-to-date methods of combating insects and diseases of the orchard and garden and in the operation of various kinds of spraying apparatus from hand pumps to gasoline power machines. Other subjects studied are the harvesting and storage of apples, especially the handling of apples in cold storage; varieties best adapted to the various sections of the state both for home use and commercial planting; pruning and other practical topics pertaining to orchard management; propagation of plants including grafting, layering, budding and the growing of cuttings; management of farm woodlots and planted groves; most profitable trees to plant; treatment of posts to prevent decay; and the laying out and ornamental planting of home grounds.

The college campus affords excellent opportunity for studying the different varieties of deciduous trees, evergreens, and other ornamentals. Leading varieties of orchard fruits and potatoes from different sections of the state are supplied for exhibition and laboratory use.

COURSE IN HORTICULTURE AND FORESTRY.

For Freshman year, see Agricultural Course, Page 23.

Sophomore Year.

THIRD SEMESTER.

		Required Semester Hours.
Horticulture 1,	Vegetable and Greenhouse	
	Crops	2½
Horticulture 19,	Dendrology	¾
Agricultural Engineering 4,	Farm Engineering	3½



A SCENE ON THE HORTICULTURAL GROUNDS.

Soils 1,	Soil Physics	4
Agricultural Chemistry 21,	Elementary Experimental Chemistry	5
Economic Science 9,	Outlines of Economics	3
Military 3, or Athletics,		—
	Total semester hours	18½

FOURTH SEMESTER.

		Required Semester Hours.	
Horticulture 7,	Pomology	2	
Horticulture 15,	Silviculture	2	
Agricultural Engineering 8,	Spraying Apparatus	1	
Zoology 16,	General Zoology	5	
Agricultural Chemistry 23,	Elementary Experimental Chemistry	5	
Choice {	Economic Science 10,	3	} 3
	History 6,	3	
	French Revolution and XIXth Century	3	
Military 4, or Athletics,		—	
	Total semester hours	18	

Junior Year.

FIFTH SEMESTER.

		Required Semester Hours.	
Choice {	Horticulture 5, and Horticulture 30,	Advanced Pomology 2⅔	} 3⅓ or 6
	Horticulture 18, and Civil Engineering 508,	Fruit Judging ⅔	
		Forest Utilization 2	
		Surveying 4	
Soils 13,	Soil Surveying and Mapping	1⅔	1⅔
Zoology 4,	Entomology	4	4
Agricultural Chemistry 25,	Agricultural Chemistry	4	4
English 12,	Argumentation	2	2
Horticulture 28,	Seminar	½	½

This course must be continued throughout the year.

Final standing will not be certified to the recorder until the close of the sixth semester.

Electives will be selected from the list on page 80,

— —
15½ 18½
— —
½ 4½

Total semester hours 16 to 20

SIXTH SEMESTER.

		Required Semester Hours.	
Choice {	Bacteriology 1,	General Bacteriology 4	} 4 6
	Horticulture 16, and Civil Engineering 609,	Forest Development and Policy 2	
		Surveying 4	
	Botany 11,	Vegetable Physiology 4	

Botany 15,	Systematic Botany	3	3
Horticulture 28,	Seminar	$\frac{1}{2}$	$\frac{1}{2}$
(See note fifth semester.)		—	—
		11½	13½
Electives will be selected from the list on page 80,		4½	8½
Total semester hours		16	to 20

Senior Year.

SEVENTH SEMESTER.

		Required Semester Hours.	
Choice {	Botany 24, and	1	
	Horticulture 4,	3	
	Bacteriology 1, }		4
	Horticulture 8,	2	2
	Horticulture 9,	2	2
	Geology 10,	4	4
	Agric. Journalism 1,	1	1
	Horticulture 29,	$\frac{1}{2}$	$\frac{1}{2}$
	Plant Embryogeny		
	Plant Breeding		
	General Bacteriology		
	Landscape Gardening		
	Research Work		
	General Geology		
	Agricultural Journalism		
	Seminar		

This course must be continued throughout the year.

Final standing will not be certified to the recorder until the close of the eighth semester.

		—	—
		13½	13½
Electives will be selected from the list on page 80,		2½	6½
Total semester hours		16	to 20

EIGHTH SEMESTER.

		Required Semester Hours.	
Horticulture 17,	Wood Technology	1½	1½
Botany 5,	Vegetable Pathology	3	5
Soils 2,	Soil Fertility	4	4
Horticulture 13,	Thesis	2	2
Horticulture 31,	Landscape Architecture	$\frac{2}{3}$	$\frac{2}{3}$
Horticulture 29,	Seminar	$\frac{1}{2}$	$\frac{1}{2}$

(See note in seventh semester)

		—	—
		11½	13½
Electives will be elected from the list on page 80,		4½	8½
Total semester hours		16	to 20

COURSES IN HORTICULTURE.

1. Vegetable and Greenhouse Crops. The general culture of vegetables in the field and under glass and also other commercial crops grown under glass. Recitations, two hours, and laboratory, two hours, per week. Two and two-thirds hours' credit.



A COLLEGE GREENHOUSE.

2. **Plant Propagation.** Propagation of plants by sexual and non-sexual methods, germination, testing and storage of seeds, multiplication of plants by cuttage, layerage and graftage, including both greenhouse and nursery types. Recitations, two hours, and laboratory, two hours, per week. Two and two-thirds hours' credit. Fee, \$1.00.

3. **Orcharding.** The establishment and care of home orchards and vineyards; systematic study of varieties adapted for planting in Iowa. Recitations, two hours, and laboratory, two hours, per week. Two and two-thirds hours' credit. Fee, \$1.00.

4. **Plant Breeding.** Study of the principles of plant breeding and their application to the improvement of plants. Horticulture 2, Botany 11, and Botany 24, prerequisite or required with this course. Recitations, three hours per week.

5. **Advanced Pomology.** Commercial orcharding; grading, storing, and marketing fruit; fruit judging; orchard and nursery technique. Prerequisites, Horticulture 2 and 7. Recitations, two hours, and laboratory, two hours, per week. Two and two-thirds hours' credit. Fee, \$1.00.

7. **Pomology.** A study of the problems involved in the establishment and care of orchards; orchard technique; spraying; tillage and soil management. Prerequisites, Horticulture 2 and Agricultural Chemistry 21. Two lectures and six hours laboratory during the last half of the semester. Two hours' credit.

8. **Landscape Gardening.** A study of the principles involved in the planting and decoration of home grounds and parks; ornamentals adapted to planting in Iowa. The ornamental trees and shrubs on the campus and in the department afford excellent material for laboratory work. Two lectures per week. Two hours' credit.

9. **Research Work.** An independent investigation in some line of work under the supervision of the head of the department. Two hours per week. Two hours' credit.

11. **Floriculture.** No course prerequisite. Propagation and general management of house plants and ornamentals for the home grounds. Recitations, two hours per week.

13. **Thesis.** The subject chosen must be one requiring independent investigation, the results of which are to be presented in a carefully written report. May be a continuation of Course 9. Two hours' credit.

28. **Horticulture and Forestry Seminar.** Horticulture and Forestry seminars will each meet once in two weeks while the College is in session, and have for their members the professors and instructors in Horticulture and Forestry, and all students in the Junior and Senior classes in the course in Horticulture and Forestry. The work will consist in the preparation, presentation, and discussion of papers on Horticulture and Forestry topics. All papers must be carefully written and submitted to the professor in charge. The schedule

of subjects is made up one semester in advance. The credit in this subject will be reported to the recorder at the close of the spring semester. One hour credit.

29. **Seminar.** A continuation of Course 28. The credit to be reported at the close of the eighth semester. One hour credit.

30. **Fruit Judging.** Scoring and judging plate displays and collections of fruit. Special attention given to the leading commercial varieties of the apple. Prerequisite, Horticulture 2 or 3. Laboratory, two hours per week. Two-thirds hour credit.

31. **Landscape Architecture.** A laboratory course in landscape designing. Prerequisite, Horticulture 8 or 11. One laboratory per week. Two-thirds hour credit.

32. **Landscape Architecture.** A continuation of Course 31 and may be taken simultaneously. One laboratory per week. Two-thirds hour credit.

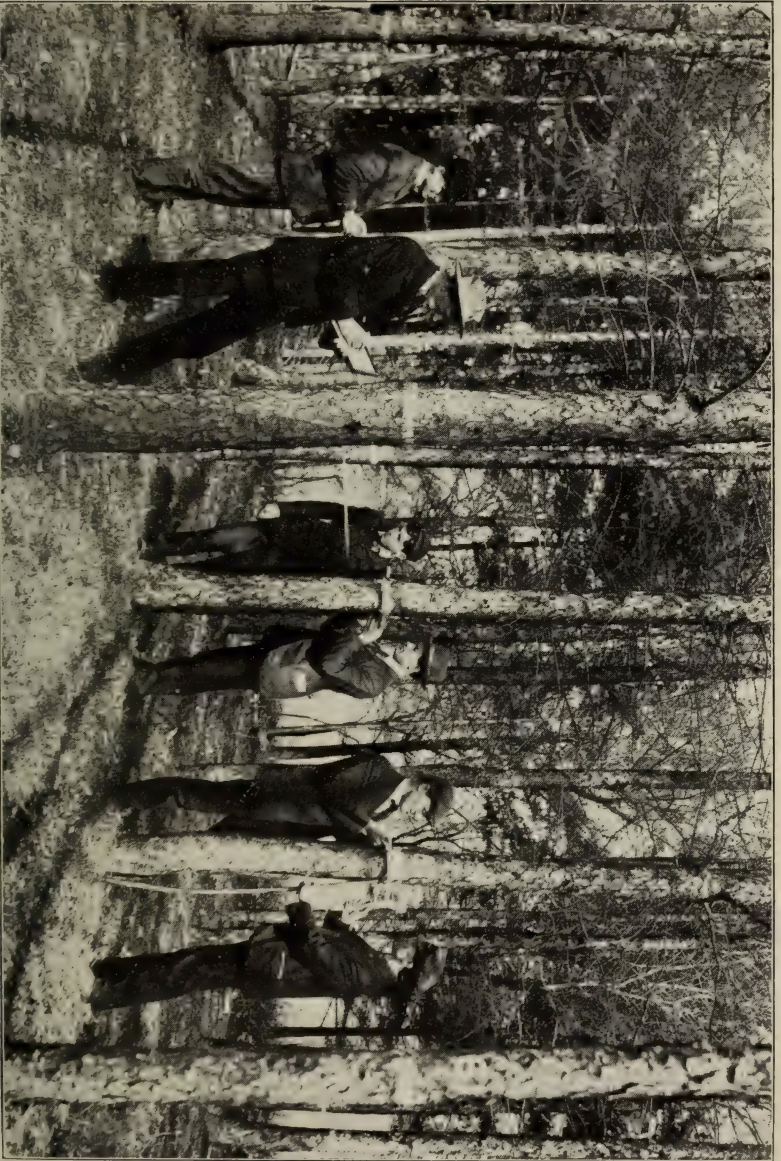
COURSES IN FORESTRY.

14. **Farm Forestry.** The life history of trees and the relation of trees to their environment; their relation to each other in the forest; their requirements for light, heat, moisture. Attention is given to the study of the influence of forests in the modification of climatic conditions with special reference to the effect of windbreaks in agricultural districts. The establishment of windbreaks, shelterbelts, and farm woodlots in Iowa. The species best suited for such planting, the kind of stock to plant and the cost of planting. The rejuvenation of natural woodlots; the preservative treatment of farm timber supplies. The classification and identification of the conifers. This course is designed to treat in a general way the forest problems that confront the Iowa farmers. Text, Principles of American Forestry, Green. Two and two-thirds hours' credit: Recitations, two hours, and field work, supplemented by lectures, two hours, per week.

15. **Silviculture.** This course is a continuation of Horticulture 19, and includes a study of the distribution and character of our native forests; methods of natural reproduction, artificial regeneration; planting seeds, care of the nursery, transplanting and planting out seedlings, treatment of woodlands; pruning, thinning, improvement cutting, and underplanting. A study of forest types and silvicultural systems, suitable for given forest conditions. Two recitations per week. Prerequisite, Horticulture 19. Two hours' credit.

16. **Forest Development and Policy.** Attitude of nations toward forestry; development of forestry in the United States; relation of forestry to national reclamation work; protection of forests against natural enemies. Two hours' credit. Two recitations per week. Text, History of Forestry, Fernow.

17. **Wood Technology.** A study of common woods, their uses, and identification by structural characteristics; methods and effects



STUDENTS DETERMINING THE VOLUME OF TREES.

of drying; methods and effects of preservative treatment. One and two-thirds hours' credit. One hour recitation and two hours laboratory.

18. **Forest Utilization.** Study of economic relations of timber to manufacturing industries; methods of logging; conversion of timber into finished products; consumption of timber products; grading of lumber. Prerequisite, Horticulture 15, and one season's work in lumber camp or mill. Two hours' credit. Two recitations per week.

19. **Dendrology.** The work in this course includes a study of the classification and identification of the broad-leaved species in both summer and winter characteristics. Each student is required to prepare a complete herbarium of broad-leaved species in full foliage and also in naked condition. The gathering and storing of forest tree seeds and the general care of nursery stock throughout the winter is taken up in this course and continued in Horticulture 15. This course is introductory to Horticulture 15. Two hours' field work per week and required preparation. Prerequisite, Horticulture 14. Text, Sargent's *Manual of Trees of North America*. Two-thirds hour credit.

20. **Timber Physics.** A study of woods, their uses and identification by structural characteristics. Methods and effects of drying timbers; methods and effects of preservative treatment of timbers. The identification of native and planted trees. Two hours' credit. Laboratory and reference work in identification of species by structural characteristics. Field work supplemented by lectures and reference work. Two hours per week.

21. **Forest Mensuration.** The work in this course embraces the measurements of felled and standing timber, determining the merchantable and total volume of single trees and entire stands, determining the annual increment in diameter and volume. Special attention is given to the use and construction of log rules and to the estimating of standing timber. Two hours' credit. Field work six hours per week. Text, *Forest Mensuration*, Graves.

Department of Agricultural Engineering

JAY BROWNLEE DAVIDSON, PROFESSOR.

EVERETT WALTER HAMILTON, ASSISTANT PROFESSOR.

DANIEL WILLIS SYLVESTER, INSTRUCTOR.

CHARLES OSMOND ALEXANDER, INSTRUCTOR.

E. Y. CABLE, EXTENSION WORK.

The development of modern agricultural machinery, the increase in the size and importance of farm structures, the improvement of land by drainage and its reclamation by irrigation and the need of better roads, demand that the successful farmer of today must be trained along mechanical and engineering lines. To supply this training and

to investigate problems related thereto is the work of the Department of Agricultural Engineering.

It is believed that the Department of Agricultural Engineering has the most complete equipment of any similar department in existence. The department occupies the two lower floors of Agricultural Engineering Hall and practically all of Agricultural Engineering Annex, a fireproof building connected with former building on the ground and first floors.

The farm machinery laboratories are located on the ground and first floors of the Annex. Each floor has a large balcony entirely surrounding the room and increasing the floor space by over one-half. A large assortment of the best modern farm machinery is contained in these laboratories.

This farm machinery equipment contains samples of traction engines, gasoline tractors, and one or more samples of almost every kind of the important lines of field and power machine used on the farm. Special apparatus for testing draft adjustment and quality of work is used in connection with these machines, including a Kohlbush direct reading dynamometer, a Stone and a Polikeit recording traction dynamometers and a special chain recording transmission dynamometer of twenty-five horsepower capacity. By means of this instrument, it is possible to accurately measure the power consumed by the smallest belt-driven machines as well as those requiring the full capacity of the instrument. Numerous other small instruments and parts of machines are used in this connection.

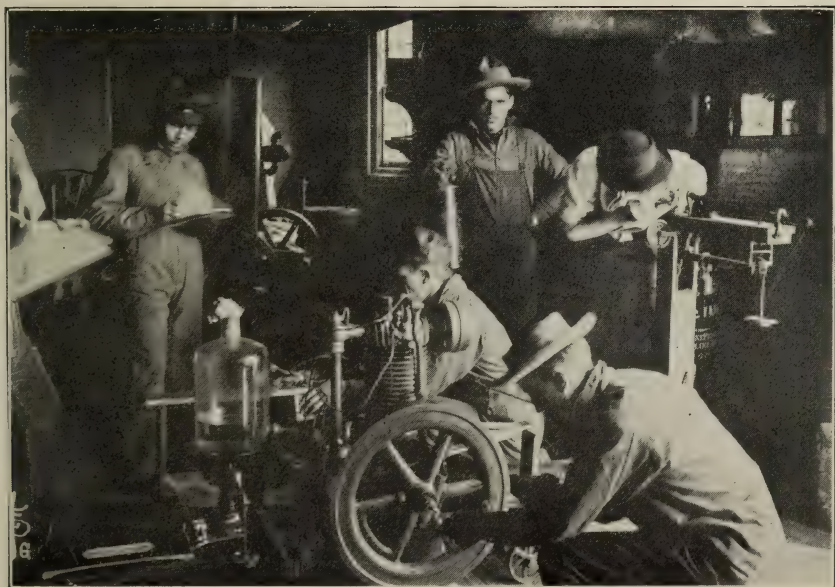
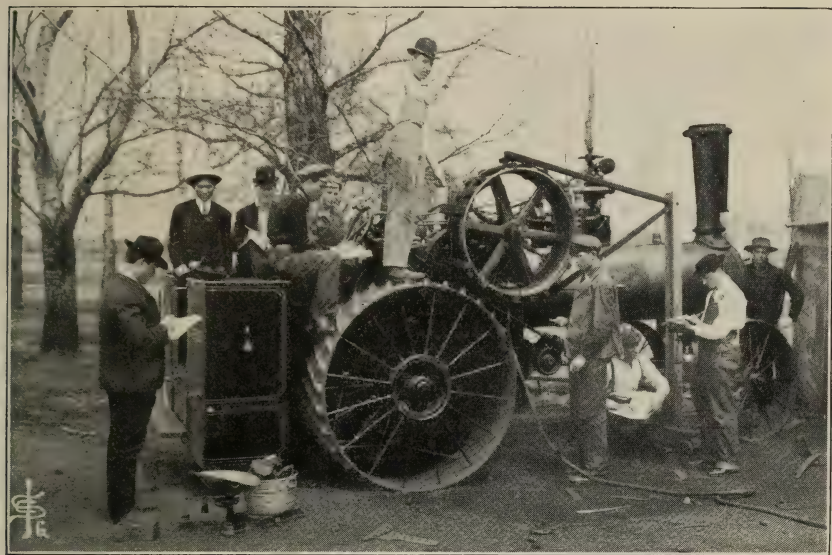
For instruction in gasoline engines, eight modern engines are provided, nearly every one representing a different type of construction. To test these, suitable brakes, indicators and other testing appliances are owned by the Department.

The steam engine laboratory contains a simple twenty horsepower engine and a thirty-five horsepower compound reversing engine. Steam is now provided from the heating plant back of the building, but a boiler will be placed in the laboratory within the next year.

Two drawing rooms are provided which will accommodate twenty-five and forty students, respectively. The cement laboratory contains bins for materials, molds, forms, an improved Fairbanks cement testing machine, and smaller apparatus. The pump laboratory contains an assortment of pumps, cylinders, tanks, and the spraying apparatus.

For teaching the course in Farm Engineering, the following instruments are provided: two Gurley transits, one Burger level, five Queen levels, five Gurley levels, and two Bostrom and Brady levels; also rods, flagstuffs, chains, hatchets, etc.

In the museum, samples of materials and ancient implements are kept. A reading and seminar room has files of all the leading periodicals pertaining to agricultural engineering and is used as a meeting room for the Agricultural Engineering Seminar.



TESTING STEAM AND GASOLINE ENGINES.

The Forge shop is equipped with twenty Buffalo down draft forges and individual tool sets together with a complete set of special tools, a press drill and grinder. The carpenter shop has benches and tool sets for thirty students and a miscellaneous tool equipment is provided in the tool room. This shop is also provided with a power cross cut and rip saw, a planer and two speed lathes.

The work of the Department is carried on in conjunction with the Agricultural Engineering Section of the Agricultural Experiment Station. An experimentalist devotes his entire time to research and is provided with a separate laboratory. This laboratory has many special instruments in the way of dynamometers, indicators, and testing machines, and also a tool equipment including a fourteen-inch engine lathe.

Commodious offices are provided for the members of the Department, in which is to be found a complete implement and farm machine catalog file, also a valuable collection of farm building plans.

COURSE IN AGRICULTURAL ENGINEERING.

The Work of the Department is principally that of giving instruction to those who intend to make the farm the object of their life work; however, the demand for instructors and others trained along these lines requires the department to offer special instruction to meet this demand.

Positions Open for Men Trained Along Agricultural Engineering Lines.

The course in Agricultural Engineering is designed to fit graduates for the following lines of work:

1. Managers and superintendents of farms, where drainage, irrigation and the use of agricultural machinery is a large factor in the management.
2. Teachers and instructors of Agricultural Engineering in agricultural colleges.
3. Teachers of practical mechanics in Agricultural High Schools.
4. Government experts in Agricultural Engineering.
5. Professional work in drainage and highway engineering.
6. Positions in the farm machinery industry requiring mechanical skill and a knowledge of the science of agriculture.

The degree of Bachelor of Agricultural Engineering (B. A. E.) is given to students who have completed a four-year course in Civil, Mechanical, or Electrical Engineering, followed by one year's prescribed work approved by the faculty, in Agricultural Engineering and related sciences, under the rules and conditions governing work in other courses.

Following is a course in Agricultural Engineering which is offered for the first time. This course is designed to be especially strong along the fundamental sciences upon which Agricultural Engineering depends.

COURSE IN AGRICULTURAL ENGINEERING.

Freshman Year.

FIRST SEMESTER.

		Required semester hours
Agricultural Engineering 1		
or 2	Shop Work	1½
Animal Husbandry 1	Market Types of Cattle and Sheep	2
Farm Crops 1	Corn Growing and Judging	2½
Horticulture 14	Farm Forestry	2½
English 10	Narration and Description	3
Mathematics 20	Algebra	4
Mathematics 21	Plane Trigonometry	1
Mechanical Engineering 181	Mechanical Drawing	1
History 17	The American People	1
Military 1	Military	
Library	Library Instruction	
Total semester hours		18¾

SECOND SEMESTER.

		Required semester hours
Agricultural Engineering 1		
or 2	Shop Work	1½
Animal Husbandry 2	Market Types of Dairy Cattle, Horses and Swine	2
Dairying 12	Farm Dairying	2½
Farm Crops 2	Grains, Grasses and Forage Crops	2½
English 11	Exposition	3
Mathematics 22	Trigonometry	2
Mathematics 23	Analytical Geometry	3
Military 2	Military Drill	
Mechanical Engineering 220	Descriptive Geometry	2
Total semester hours		18¾

Sophomore Year.

THIRD SEMESTER.

		Required semester hours
Agricultural Engineering 4	Farm Engineering	3½
Mathematics 24	Analytical Geometry	2
Mathematics 25	Calculus	3
Physics 303	Mechanics and Heat	5
Mechanical Engineering 322	Mechanical Drawing	1
Chemistry 21	Agricultural Chemistry	5

Military or Athletics

 Total semester hours $19\frac{1}{3}$

FOURTH SEMESTER.

		Required semester hours
Agricultural Engineering 5	Farm Machinery and Farm Motors	$2\frac{2}{3}$
Chemistry 23	Elementary Experimental Chem- istry	5
Physics 404	Electricity and Magnetism and Light and Sound	5
Mathematics 26	Differential and Integral Calculus	4
Mechanical Engineering 401	Analytical Mechanics	3
Military or Athletics		

 Total semester hours $19\frac{2}{3}$

Junior Year.

FIFTH SEMESTER.

		Required semester hours
Agricultural Engineering 3	Farm Blacksmithing and Horse- shoeing	$1\frac{1}{3}$
Agricultural Engineering 7	Dairy Engineering	$1\frac{2}{3}$
Soils 1.	Soil Physics	4
Mechanical Engineering 502	Analytical Mechanics	5
Mechanical Engineering 512	Engineering Laboratory	1
Economic Science 9	Outlines of Economics	3
Civil Engineering 345	Surveying	2
Agricultural Engineering 14	Seminar	$\frac{1}{2}$

This course must be carried throughout the year, and final standing will not be certified to the recorder until the close of the sixth semester.

Total semester hours $18\frac{1}{2}$

SIXTH SEMESTER.

		Required semester hours
Agricultural Engineering 6	Rural Architecture	3
Agricultural Engineering 9	Research Work in Agricultural Engineering	2
Soils 2	Soil Fertility	4
Mechanical Engineering 606	Analytical Mechanics	5
Mechanical Engineering 613	Engineering Laboratory	1
Civil Engineering 653	Materials of Construction	2
Civil Engineering 446	Surveying	2
Agricultural Engineering 14	Seminar	$\frac{1}{2}$

(See note fifth semester.)

 Total semester hours $19\frac{1}{2}$

Senior Year.

SEVENTH SEMESTER.

		Required semester hours
Agricultural Engineering 10	Research in Agricultural Engineering	2
Farm Crops 8	Farm Management	2 $\frac{2}{3}$
Horticulture 8	Landscape Gardening	2
Veterinary 44	Sanitary Science	2
Mechanical Engineering 714	Laboratory	1
English 12	Argumentation	2
Animal Husbandry 20	Animal Feeding	2
Agricultural Engineering 15	Seminar	$\frac{1}{2}$

This course must be carried throughout the year, and final statements will not be certified to the recorder until the close of the eighth semester.

Electives will be selected from the list on page 80,

14 $\frac{1}{6}$
1 $\frac{5}{8}$ to 5 $\frac{5}{8}$

Total semester hours, 16 to 20

EIGHTH SEMESTER.

		Required semester hours	
Agricultural Engineering 11 or 12		3	5
Mechanical Engineering 533	Shop Work	2	2
Horticulture 20	Timber Physics	2	2
History 18	The American Statesman	1	1
Horticulture 31	Landscape Laboratory	$\frac{2}{3}$	$\frac{2}{3}$
Agricultural Engineering 15	Seminar	$\frac{1}{2}$	$\frac{1}{2}$

(See note seventh semester.)

9 $\frac{1}{6}$ 11 $\frac{1}{6}$
6 $\frac{5}{8}$ to 10 $\frac{5}{8}$

Electives will be selected from the list on page 80,

Total semester hours, 16 to 20

COURSES IN AGRICULTURAL ENGINEERING.

1. **Shop Work.** Blacksmithing, forging and welding of iron and steel, and making and tempering hand-tools. Work designed to be especially helpful in the repair and operation of machinery. One and one-third hours' credit. Four hours per week. Fee, \$2.50.

2. **Shop Work.** Carpentry, care, use and sharpening of tools, laying off work, making of joints and framing. Work designed to be especially helpful in the planning, framing, and construction of farm buildings. One and one-third hours' credit. Four hours per week. Fee, \$2.50.

3. **Farm Blacksmithing and Horse Shoeing.** An advanced course in blacksmithing. One and one-third hours' credit. Laboratory, four hours per week. Fee, \$2.50.

4. **Farm Engineering.** Includes instruction in Agricultural Surveying, also a study of location of drainage districts, drainage laws, and best systems of drainage; location and construction of roads; the building of fences and concrete construction in farm work; also drawing, including lettering, map making, planning of drainage systems and road profiles; and field work, including care, adjustment and practice in the use of surveying instruments. Prerequisite, Mathematics 17. Three and one-third hours' credit. Recitation, two hours, and laboratory, four hours, per week. Fee, \$2.00.

5. **Farm Machinery and Farm Motors.** Includes a brief study of mechanics and materials; a study of the development, construction, functions and methods of operating, adjusting and repairing implements and machinery; also the study of the principles of draft and the production of power. Laboratory work devoted to the comparative analysis and testing the machines discussed in the class room. Two and two-thirds hours' credit. Recitations, two hours, and laboratory, two hours. Fee, \$2.00.

6. **Rural Architecture.** Embraces the planning of all farm buildings, a study of their construction, lighting, ventilation, cost, convenience, also testing the strength of building materials, and making of plans and specifications. Prerequisite, Agricultural Engineering 4. Three hours' credit. Recitation, one hour, and laboratory, six hours, per week.

7. **Dairy Engineering.** Special work in the management, care and operation of steam and gasoline engines. One and two-thirds hours' credit. Recitation, one hour, and laboratory, two hours, per week. Fee, \$2.00.

8. **Spraying Apparatus.** Precedes Field Practice in Horticulture 7 in the same semester. A brief study of the mechanics of pumps, also the care, operation and repair of spraying apparatus. One hour credit. Recitation, one hour, and laboratory, three hours, per week for one-half semester. Fee, \$1.00.

9. **Research Work in Agricultural Engineering.** The large equipment of machinery and instruments in this department offers to the student a wide range of subjects for research work, as Drainage, Farm Water Supply, Sewerage, Road Construction, Fences, Use of Cement on the Farm, Testing and Calibrating Various Farm Machines and Traction Tests. Prerequisites, Agricultural Engineering 4 and 5. Two hours' credit. Fee, \$2.00.

10. **Research Work in Agricultural Engineering.** Work same as in 9. Prerequisites, Agricultural Engineering 4 and 5. Two hours' credit. Fee, \$2.00.

11. **Thesis.** Must be upon some subject requiring original work taken in Agricultural Engineering. Three hours' credit.

12. **Thesis.** Same as Agricultural Engineering 11, except five hours' credit.

13. **Gas and Oil Engines.** May be substituted for part of Agricultural Engineering 9 and 10 in the Agricultural Engineering Course. A comprehensive course in the practical operation and management of the internal combustion engine. The course includes a study of the development, the existing types, the theory and practice of operation, the adjustment, the repair and the utility of gas, gasoline, oil, and alcohol engines. The laboratory work will consist of well arranged tests and exercises to familiarize the student with the practical care and management of this type of motor. One recitation and one laboratory period per week. Two hours' credit. Fee, \$2.00.

14. **Agricultural Engineering Seminar.** One hour credit.

15. **Agricultural Engineering Seminar.** One hour credit.

The Agricultural Engineering Seminar (Courses 14 and 15) meets once each two weeks while College is in session and has for its members the professors and instructors in Agricultural Engineering and all students in the Junior and Senior Classes in the course in Agricultural Engineering. This consists in the preparation, presentation and discussion of papers on Agricultural Engineering subjects. All papers must be carefully written and submitted to the professor in charge. The schedule of subjects are made up one semester in advance.

SCIENCE AND AGRICULTURE.

The field of Agriculture presents such rapid changes and there is such wide and varied demand for young men combining agricultural and scientific training that it has been deemed advisable to offer a course less technical than the other agricultural courses that relate directly to some special line.

The course in Science and Agriculture is designed to meet the demands of country agricultural high schools and other institutions, public and private, established for the purpose of giving instruction in the general sciences and elementary instruction in agriculture. There will doubtless arise a large demand for strong, broadly educated, well trained teachers for this and other kinds of agricultural instruction in public and preparatory schools where the work is now being introduced.

A new phase of agricultural education has developed in recent years in the various forms of agricultural extension work. This movement is destined to be far reaching in its results and it is clearly one of the most potent influences in the field of agriculture. This phase of agricultural instruction, which is bringing science to the aid of agricul-

ture by reaching the man in the field and on the farm, the children in the public school and the family in the home, is calling for well trained men far in excess of the supply.

COURSE IN SCIENCE AND AGRICULTURE.

Freshman Year.

FIRST SEMESTER.

		Required Semester Hours
Farm Crops 1	Corn Growing and Judging	2½
English 10	Narration and Description	3
Mathematics 17	Algebra and Trigonometry	3
History 19	The Making of the Nation, 1783-1817.	2
Bacteriology 1	General Bacteriology	4
Agricultural Chemistry 21	Elementary Experimental Chemistry	5
Military 1		—
		19½

SECOND SEMESTER.

		Required Semester Hours
Farm Crops 2	Grains, Grasses and Forage Crops	2½
English 11	Exposition	3
Physics 205	Mechanics, Heat and Light	3
Agricultural Chemistry 23	Elementary Experimental Chemistry	5
Zoology 16	General Zoology	5
Military 2		—
		18½

Sophomore Year.

THIRD SEMESTER.

		Required Semester Hours
Animal Husbandry 1	Market Types of Cattle and Sheep	2
Horticulture 19	Dendrology	2½
Horticulture 3	Orcharding	2½
Zoology 4	Entomology	4
Agricultural Chemistry 25	Elementary Experimental Chemistry	4
Economic Science 9	Outlines of Economics	3
English 12	Argumentation	2
Military 3, or Athletics		—
		18½

FOURTH SEMESTER.

		Required Semester Hours
Animal Husbandry 2	Market Types of Dairy Cattle,	
	Horses and Swine	2
Farm Crops 4	Grain Breeding and Judging	2
Horticulture 2	Plant Propagation	2 $\frac{2}{3}$
Horticulture 15	Silviculture	2
Botany 15	Systematic Botany	3
Agricultural Chemistry 26	Elementary Experimental Chem- istry	4
History 4	Division and Reunion	3
Military 4, or Athletics		—
		18 $\frac{2}{3}$

Junior Year.

FIFTH SEMESTER.

At the beginning of the Junior year one of the two optional groups of studies listed for the Senior College must be selected. Students who elect an Optional Group will be required to carry the studies of that group as listed or arranged for the Junior and Senior years.

		Required Semester Hours
Required:		
Soils 1	Soil Physics	4
Literature 4	American Literature	3
		—
		7
Optional:		
Group I: History 20	History of Education	2
Psychology 7	Descriptive Psychology	3
		—
		5

Elective:

The student with the approval of the Dean of Agriculture, will select from the list of electives on page 80, enough work to make a total of from sixteen to twenty hours per week.

The studies listed under Optional Group I, throughout the Junior and Senior years, except Economic Science 16, are required to secure without examination a five-year State Teacher's Certificate upon graduation. Those who do not take these subjects will be entitled to a two-years' State Teacher's Certificate upon graduation, but will be required to pass an examination upon them within two years to have the certificate renewed.

Group II: The student shall select from one of the agricultural

courses, with the approval of the Dean of Agriculture and the Head of the Department concerned, a major line or a major and a supporting line of study of not less than seven hours per week during any one semester. The total number of hours of the major line, however, shall not be less than twenty hours for the two years.

SIXTH SEMESTER.

		Required Semester Hours
Required:		
Botany 11	Vegetable Physiology	4
Soils 2	Soil Fertility	4
		—
		8
Optional:		
Group I: Economic Science		
16	Actual Government	3
History 21	History of Education	2
Psychology 8	Descriptive Psychology	3
		—
		8

See statement for Optional Group I, first semester, Junior Year.

Group II: See statement for Group II, first semester, Junior Year.

Elective:

The student, with the approval of the Dean of Agriculture, will select from the list of electives on page 80, enough work to make a total of from sixteen to twenty hours per week.

Senior Year.

SEVENTH SEMESTER.

		Required Semester Hours
Required:		
Botany 5	Vegetable Pathology	3
Geology 10	General Geology	4
		—
		7
Optional:		
Group I: Psychology 5		
	Psychological Principles of Education	3
Civics 11	Methods of Teaching	2
		—
		5

See statement for Optional Group I, first semester, Junior Year.

Group II: See statement for Group II, first semester, Junior Year.

Elective:

The student, with the approval of the Dean of Agriculture, will select from the list of electives on page 80, enough work to make a total of from sixteen to twenty hours per week.

EIGHTH SEMESTER.

Optional:

Group I: Psychology 6	Child Psychology	3
Civics 12	Methods of Teaching	2
		—
		5

See statement for Optional Group I, first semester, Junior Year.

Group II: See statement for Group II, first semester, Junior Year.

Elective:

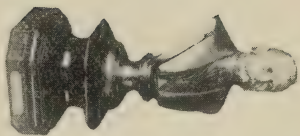
The student, with the approval of the Dean of Agriculture, will select from the list of electives on page 80, enough work to make a total of from sixteen to twenty hours per week.

Department of Agricultural Journalism

CLIFFORD VERNE GREGORY, ASSISTANT.

Four years ago a chair in Agricultural Journalism was established at the Iowa State College by the aid of Mr. John Clay, of the firm of Clay, Robinson & Co., of Chicago. This was distinctly a new departure in the field of agricultural education. By many agricultural journalism was looked upon as a field of labor of peculiar limitations, a field in which excellence could be obtained by heredity, but not by training or study. Mr. Clay, who is himself a most forcible writer, combining to a remarkable degree a wide range of practical information and a fascinating style, believed that training would count for something in this, as in all other lines of agricultural work. His address on "The Plow and the Book," delivered at Ames at the inception of this movement, has attracted wide attention.

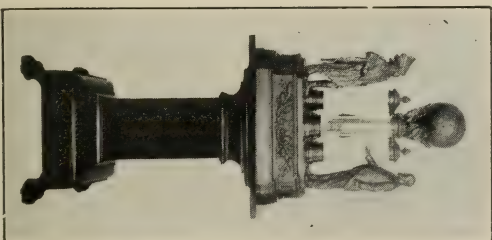
The work, though started in a moderate way, has led to highly gratifying results. It has proven popular with the agricultural students, who have learned that there is great benefit to be derived from the study of this important subject. The graduates who have taken this work at Ames have given good account of themselves. A student who graduated two years ago immediately took a position on one of the leading agricultural papers. At the end of his first year's service his employer was pleased to contract with him for three years' service at



DIÁZ TROPHY.



THE SPOOR CATTLE TROPHY.



THE COOK CORN TROPHY.



INTERNATIONAL TROPHY.



THE SPOOR HORSE TROPHY.

INTERNATIONAL TROPHIES WON BY IOWA STATE COLLEGE STUDENTS.

a salary of \$2,500 for the third year. A student who graduated a year ago accepted a similar position on another paper and within a short time was advanced to an important editorial position on another paper of wide influence. One of the graduates in the class of 1908 was given an immediate position as associate editor on one of the leading western farm weeklies. A student in the 1909 class left school to accept a very attractive position as associate editor on one of the best farm papers in the East.

Not all students are qualified for editorial work, but all may be helped and strengthened by a good course in agricultural journalism, whether they intend to follow this calling or not. The ability to prepare a concise, readable article for publication is invaluable to the agricultural college graduate, no matter what line of work he intends to take up.

A man who has employed a number of Ames men for special work along this line said he had never yet been disappointed in one of them. An editor of a prominent agricultural paper, after passing on the work of one of the classes, said: "I don't think I need hesitate to say that I never got hold of nine articles that showed more uniform excellence, more care in preparation and observance of instruction received in the classroom."

In the Live Stock World reporting contest at the 1906 International, Ames men won three out of four first prizes and one-half of the money offered. In the National Corn show contest in 1907, Ames students won thirty-five out of sixty prizes and 68 per cent of the money offered, in competition with one hundred and fifty contestants from nine states. In the Iowa Corn Growers' contest in 1908, Ames students won first, second and third prizes and all of the money offered. All of these contests were based upon writing on practical subjects, with practical men as judges.

The work in agricultural journalism is proving that this subject has a place in the curriculum of a modern, well-equipped agricultural college, and in the education of the future farmer. The work not only stimulates a study of the essentials of agricultural journalism, but it admirably supplements a student's training in English, in clear, concise expression, and his knowledge of general agricultural topics.

1. **Beginning Journalism.** This course is a general introduction to the study of Agricultural Journalism. The subject is taken up mainly from the contributor's standpoint. The aim of the course is to teach the student to write concise, readable, newspaper English. A lecture is given every two weeks, the alternate lecture period being devoted to a study of the articles that have been written by the students. The student is required to hand in an assignment every two weeks. This is corrected and criticized from the editor's standpoint. This detailed, practical criticism does much to improve the writer's style. The lectures for this semester include the following

subjects: "The Growth of Journalism," "The Place of Agricultural Journalism," "Style," "Preparing and Submitting Articles," "A Study of the Agricultural Press," "The Importance of Brevity and Conciseness," "Publicity," "Agricultural Reporting," "Writing in the Form of Notes." Prerequisites, all the required courses in English. One hour credit.

2. Advanced Journalism. This is a continuation of Course 1, special emphasis being given to the development of originality and literary excellence. The work is taken up in much the same manner as in the previous semester. A large share of the matter written by the students in this course is accepted for publication in the leading agricultural papers. The lectures include: "History of Journalism," "The Development of Individuality," "The Selection of a Title," "The Value of Imagination," "Developing Originality," "Writing Feature Articles," "Writing for Special Issues," "Story Writing (from the standpoint of the agricultural papers)." During this semester several lectures are given to the class by men prominent in agricultural journalism. These lectures are invaluable in bringing the student into touch with the best agricultural papers and their needs. During the latter part of the semester a lecture is given by the Experiment Station Photographer, on "Photography in Its Relation to Journalism." Prerequisite, Journalism 1. One hour credit.

3. Newspaper Management. Courses 3 and 4 deal with actual management of an agricultural paper. They are taken up in connection with the student paper, the "Iowa Agriculturist." The Editor and Business Manager of this paper are elected by the Agricultural Club. In consultation with the Instructor in Agricultural Journalism, they choose a staff, which includes so far as possible all the students who wish to take the course in Newspaper Management. This staff meets once each week with the Instructor in Agricultural Journalism to talk over matters relating to the management of the paper. The following are among the subjects taken up: "Editing MS," "Copy Reading," "Proof Reading," "The Make-Up of an Agricultural Paper," "Writing Editorials," "Reviewing Books and Bulletins," "Agricultural Advertising," "The Work of the Circulation Manager," "The Preparation of Special Issues." The Instructor in Journalism makes no attempt to dictate the policy of the paper, all matters of that nature being left to the Editor and Business Manager. Prerequisite, Journalism 1. With the consent of the instructor, students may take Journalism 1 and 3 at the same time. One hour credit.

4. Newspaper Management. A continuation of course 3. Prerequisite, Journalism 1. One hour credit.

SUMMARY OF AGRICULTURAL COURSES.

Note—(The number before the parenthesis indicates the course number; the number in the parenthesis indicates the number of hours' credit.)

AGRONOMY COURSE.

Note—(The numbers after the hyphens indicate courses required of students taking one of the two special lines.)

	Hours Credit	
	Farm Crops Special Line	Soils Special Line
Agricultural Chemistry 21 (5), 23 (5), 25(4)	14	14
Agricultural Engineering 1 (1½), 2 (1½), 4 (3½), 5 (2½),	8½	8½
Animal Husbandry 1 (2), 2 (2), 3 (3½), 4 (3½), 20 (2) 21 (2)	14½	14½
Bacteriology 1 (4)	4	4
Botany 5 (3), 11 (4), 24 (1)	8	8
Dairying 12 (2½)	2½	2½
Economic Science 9 (3)	3	3
English 10 (3), 11 (3), 12 (2)	8	8
Farm Crops 1 (2½), 2 (2½), 3 (2), 4 (2), 8 (3), 17 (2)— 9 (2), 10 (2), 15 (3), 19 (1), 20 (1)	23½	14½
History 19 (2)	2	2
Horticulture 2 (2½), 3 (2½), 4 (3), 14 (2½)	11	11
Library 1	R	R
Mathematics 17 (3)	3	3
Military 1, 2, 3 or Athletics, 4 or Athletics	R	R
Physics 205 (3)	3	3
Soils 1 (4), 2 (4), 6 (2), 8 (3),—3 (2), 4 (2), 11 (3), 17 (1), 18 (1)	13	22
Veterinary 56 (1)	1	1
Zoology 16 (5), - 4 (4)	9	9
Electives (See page —), (5%), (9½)	10½	10½
Totals	138½	138½

	Hours Credit
DAIRYING COURSE.	
Agricultural Chemistry 21 (5), 23 (5), 25 (4), 26 (4), 40 (4)	22
Agricultural Engineering 1 ($1\frac{1}{3}$), 2 ($1\frac{1}{3}$), 7 ($1\frac{2}{3}$)	$4\frac{1}{3}$
Animal Husbandry 1 (2), 2 (2), 3 ($3\frac{1}{3}$), 4 ($3\frac{1}{3}$), 15 (1), 20 (2), 21 (2)	$15\frac{2}{3}$
Bacteriology 1 (4)	4
Botany 25 (2)	2
Dairying 11 (3), 12 ($2\frac{2}{3}$), 13 ($1\frac{2}{3}$), 14 ($3\frac{1}{3}$), 16 (1), 17 (4), 19 (2), 20 ($3\frac{1}{3}$), 21 ($1\frac{2}{3}$), 23 (2), 24 ($2\frac{2}{3}$), 26 (1), 27 (1), 28 (1)	30
Economic Science 9 (3)	3
English 10 (3), 11-(3), 12 (2)	8
Farm Crops 1 ($2\frac{2}{3}$), 2 ($2\frac{2}{3}$)	$5\frac{1}{3}$
History 19 (2)	2
Horticulture 2 ($2\frac{2}{3}$), 3 ($2\frac{2}{3}$), 14 ($2\frac{2}{3}$)	8
Library 1	R
Mathematics 17 (3)	3
Military 1, 2, 3 or Athletics, 4 or Athletics	R
Physics 205 (3)	3
Public Speaking 10 (2), 11 (2)	4
Veterinary 44 (2), 56 (1)	3
Electives ($3\frac{2}{3}$), ($3\frac{2}{3}$), (1), (8)	$16\frac{1}{3}$
Economics 10 or History 6 (3 hrs.)	3
Total	$136\frac{1}{3}$

ANIMAL HUSBANDRY COURSE.

	Hours Credit	
	Animal Husbandry Regular Line	Poultry Special Line
Agricultural Chemistry 21 (5), 23 (5), 25 (4), 26 (4)	18	18
Agricultural Engineering 1 ($1\frac{1}{3}$), 2 ($1\frac{1}{3}$), 4 ($3\frac{1}{3}$), 5 ($2\frac{3}{4}$)	$8\frac{2}{3}$	$8\frac{2}{3}$
Animal Husbandry 1 (2), 2 (2), 3 ($3\frac{1}{3}$), 4 ($3\frac{1}{3}$), 8 (2), 9 (2), 10 (2), 11 (2), 12 (2), 22 (1), 31 ($2\frac{2}{3}$), 37 ($2\frac{2}{3}$) Additional for Regular Students 6 ($1\frac{1}{3}$), 7 (2), 13 (1), 14 (1), 15 (1), 16 (1), 17 (1), 23 (1) Additional for Poultry Students 30 ($2\frac{2}{3}$), 32 (1), 33 (1), 34 (1), 35 (1), 36 (1), 38 (1), 39 (1), 40 (1), 41 (2), 42 (2)	$36\frac{1}{3}$	$41\frac{2}{3}$
Agricultural Journalism for Poultry Students 1 (1), 2 (1)		2
Bacteriology, for Poultry Students		4
Botany 26 (2)	2	2
Dairying 12 ($2\frac{2}{3}$)	$2\frac{2}{3}$	$2\frac{2}{3}$
Economic Science for Poultry Students 9 (3)		3
English 10 (3), 11 (3), 12 (2)	8	8
Farm Crops 1 ($2\frac{2}{3}$), 2 ($2\frac{2}{3}$)	$5\frac{1}{3}$	$5\frac{1}{3}$
History 19 (2)	2	2
Horticulture 2 ($2\frac{2}{3}$), 3 ($2\frac{2}{3}$), 14 ($2\frac{2}{3}$)	8	8
Library 1 (R)	R	R
Mathematics 17 (3)	3	3
Military 1, 2, 3 or Athletics, 4 or Athletics	R	R
Physics 205 (3)	3	3
Soils 1 (4), 2 (4)	8	8
Veterinary 18 (2), 23 (2), 44 (2), 56 (2) Additional for Regular Students 16 (2), 19 (1), 55 ($1\frac{1}{3}$)	$11\frac{1}{3}$	7
Zoology 2 (5), 3 (5), 5 (3), 6 (1), 8 (2)	16	16
Electives: For Regular Students ($7\frac{5}{8}$), ($1\frac{1}{2}$) For Poultry Students ($\frac{1}{2}$)	$9\frac{1}{3}$	$\frac{1}{2}$
Total	$141\frac{2}{3}$	$142\frac{5}{8}$

HORTICULTURE AND FORESTRY COURSE.

	Hours Credit	
	Horticulture Special Line	Forestry Special Line
Agricultural Chemistry 21 (5), 23 (5), 25 (4)	14	14
Agricultural Engineering 1 ($1\frac{1}{3}$), 2 ($1\frac{1}{3}$), 4 ($3\frac{1}{3}$), 8 (1)	7	7
Agricultural Journalism 1 (1)	1	1
Animal Husbandry 1 (2), 2 (2),	4	4
Bacteriology 1 (4)	4	4
Botany 11 (4), 15 (3)	7	7
For Special Horticultural Students 5 (3), 24 (1)	4	
For Forestry Students 5 (5)		5
Civil Engineering for Special Forestry Students 508 (4), 609 (4)		8
Dairying 12 ($2\frac{2}{3}$)	$2\frac{2}{3}$	$2\frac{2}{3}$
Economic Science 9 (3)	3	3
Economic Science 10 or History 6 (each 3 hrs.)	3	3
English 10 (3), 11 (3), 12 (2)	8	8
Farm Crops 1 ($2\frac{2}{3}$), 2 ($2\frac{2}{3}$)	$5\frac{1}{3}$	$5\frac{1}{3}$
Geology 10 (4)	4	4
History 19 (2)	2	2
Horticulture 1 ($2\frac{2}{3}$), 2 ($2\frac{2}{3}$), 7 (2), 8 (2), 9 (2), 13 (2), 14 ($2\frac{2}{3}$), 15 (2), 17 ($1\frac{1}{3}$), 19 ($\frac{2}{3}$), 28 (1), 29 (1), 31 ($\frac{2}{3}$)		
For Horticultural Students 4 (3), 5 ($2\frac{2}{3}$), 30 ($\frac{2}{3}$)	$29\frac{1}{3}$	
For Forestry Students 16 (2), 18 (2)		27
Library 1	R	R
Mathematics 17 (3)	3	3
Military 1, 2, 3 or Athletics, 4 or Athletics	R	R
Physics 205 (3)	3	3
Soils 1 (4), 2 (4), 13 ($1\frac{1}{3}$)	$9\frac{2}{3}$	$9\frac{2}{3}$
Veterinary 56 (1)	1	1
Zoology 4 (4), 16 (5)	9	9
Electives:		
For Horticultural Students ($\frac{1}{2}$), ($4\frac{1}{2}$), ($2\frac{1}{2}$), ($4\frac{1}{6}$)	$11\frac{1}{3}$	
For Forestry Students ($2\frac{1}{2}$), ($2\frac{1}{2}$), ($2\frac{1}{6}$)		$7\frac{1}{6}$
	—	—
Totals	$135\frac{2}{3}$	$137\frac{5}{6}$

AGRICULTURAL ENGINEERING COURSE.

	Hours Credit
Agricultural Chemistry 21 (5), 23 (5)	10
Agricultural Engineering 1 ($1\frac{1}{3}$), 2 ($1\frac{1}{3}$), 3 ($1\frac{1}{3}$), 4 ($3\frac{1}{3}$), 5 ($2\frac{2}{3}$), 6 (3), 7 ($1\frac{2}{3}$), 9 (2), 10 (2), 11 (3), 14 (1), 15 (1)	23 $\frac{1}{3}$
Animal Husbandry 1 (2), 2 (2), 20 (2)	6
Civil Engineering 345 (2), 653 (2), 446 (2)	6
Dairying 12 ($2\frac{2}{3}$)	2 $\frac{2}{3}$
Economic Science 9 (3)	3
English 10 (3), 11 (3), 12 (2)	8
Farm Crops 1 ($2\frac{2}{3}$), 2 ($2\frac{2}{3}$), 8 ($2\frac{2}{3}$)	8
History 17 (1), 18 (1)	2
Horticulture 8 (2), 14 ($2\frac{2}{3}$), 20 (2), 31 ($\frac{2}{3}$)	7 $\frac{1}{3}$
Library 1	R
Mathematics 20 (4), 21 (1), 22 (2), 23 (3), 24 (2), 25 (3), 26 (4)	19
Mechanical Engineering 181 (1), 220 (2), 322 (1), 401 (3), 502 (5), 512 (1), 533 (2), 606 (5), 613 (1), 714 (1)	22
Military 1, 2, 3 or Athletics, 4 or Athletics	R
Physics 303 (5), 404 (5)	10
Soils 1 (4), 2 (4)	8
Veterinary 44 (2)	2
Electives ($1\frac{5}{6}$), ($6\frac{5}{6}$)	8 $\frac{2}{3}$

Total

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SCIENCE AND AGRICULTURE COURSE.

Agricultural Chemistry 21 (5), 23 (5), 25 (4), 26 (4)	18
Animal Husbandry 1 (2), 2 (2)	4
Bacteriology 1 (4)	4
Botany 5 (3), 11 (4), 15 (3)	10
Economic Science 9 (3)	3
English 10 (3), 11 (3), 12 (2)	8
Farm Crops 1 ($2\frac{2}{3}$), 2 ($2\frac{2}{3}$), 4 (2)	7 $\frac{1}{3}$
Geology 10 (4)	4
History 4 (3), 19 (2)	5
Horticulture 2 ($2\frac{2}{3}$), 3 ($2\frac{2}{3}$), 15 (2), 19 ($\frac{2}{3}$)	8
Literature 4 (3)	3
Mathematics 17 (3)	3
Military 1, 2, 3 or Athletics, 4 or Athletics	R
Physics 205 (3)	3
Soils 1 (4), 2 (4)	8
Zoology 4 (4), 16 (5)	9
Electives:	
Choice { Group I (23) and electives (4), (4), (11) } { Group II (28) and electives (2), (1), (2), (9) }	42

			Hours Credit
Group I:			
Economic Science	16 (3)	3	
Civics	11 (2), 12 (2)	4	
History	20 (2), 21 (2)	4	
Psychology	5 (3), 6 (3), 7 (3), 8 (3)	12	
Group II:			
Major and supporting line (7), (7), (7), (7). Total, 28.			
Total			139½

ELECTIVES IN THE AGRICULTURAL COURSES.

Subjects which may be elected in the Junior or Senior Year in any of the Agricultural courses, provided the student has the prerequisites for each study chosen:

Semester. Department. Course Numbers, and Hours.

First Agricultural Chemistry 27 (3), 40 (4).

Second Agricultural Chemistry 26 (4), 34 (5), 56 (5).

First Agricultural Engineering 3 (3½), 4 (3½), 7 (1½), 9 (2), 13 (2).

Second Agricultural Engineering 5 (2½), 6 (3), 8 (1), 9 (2), 13 (2).

First Agricultural Journalism 1(1), 3 (1).

Second Agricultural Journalism 2 (1), 4 (1).

First Animal Husbandry 9 (2), 11 (2), 20 (2), 21 (2), 30 (2½), 31 (2½), 32 (1), 35 (1), 38 (1), 41 (2).

Second Animal Husbandry 7 (2), 12 (2), 33 (1), 34 (1), 36 (1), 39 (1), 42 (2).

First Bacteriology 1 (4).

Second Bacteriology 1 (4), 5 (4).

First Botany 4 (5), 5 (3 or 5), 13 (2), 19 (2), 60 (2).

Second Botany 11 (4), 12 (4), 15 (3), 23 (1 to 5), 25 (2), 36 (4).

First Civil Engineering 308 (4).

Second Civil Engineering 409 (4), 713 (2).

First Dairying 14 (3½), 17 (4), 26 (1).

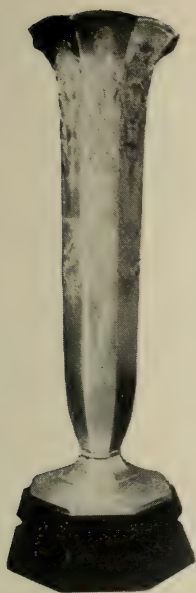
Second Dairying 11 (3), 13 (1½), 16 (1), 20 (3½), 21 (1½), 24 (2½), 25 (3), 27 (1).

First Economic Science 1 (5), 3 (3), 7 (2), 9 (3), 13 (1), 17 (2), 19 (2), 22 (3).

Second Economic Science 4 (2), 5 (3), 6 (2), 10 (3), 11 (2), 20 (1), 21 (2).

First English 7 (1), 13 (2).

Second English 8 (1).



TROPHIES WON BY AMES STUDENTS AT NATIONAL DAIRY SHOW,
CHICAGO, DECEMBER, 1908.

SWEEPSTAKES FOR BEST ALL-ROUND JUDGING, AND THREE
BREED CHAMPIONSHIPS.

- First Farm Crops 3 (2), 8 (3), 10 (2), 11 (2), 17 (2).
 Second Farm Crops 4 (2), 10 (2), 12 (1½), 18 (5).
 First Geology 704 (4), 10 (4).
 Second Geology 607 (4), 805 (4), 2 (4), 6 (4), 9 (2).
 First History 3 (3), 5 (3), 10 (2), 12 (2).
 Second History 4 (3), 5 (3), 6 (3), 9 (2), 11 (2), 20 (2), 21 (2).
 First Horticulture 1 (2⅔), 4 (3), 5 (2⅔), 8 (2), 9 (2), 18 (2), 19 (⅔),
 21 (2), 30 (⅔).
 Second Horticulture 7 (2), 15 (2), 16 (2), 17 (1⅔), 31 (⅔), 32 (⅔).
 First Modern Languages:
 Language (French) 1 (5), 3 (3).
 Language (German) 5 (5), 16 (3).
 Language (Spanish) 30 (5).
 Second Modern Languages:
 Language (French) 2 (5), 4 (3).
 Language (German) 6 (5), 17 (3).
 Language (Spanish) 31 (5).
 First Literature 1 (3), 4 (3), 6 (2), 8 (2).
 Second Literature 2 (5), 3 (3), 7 (2), 10 (3), 11 (2), 13 (2), 14 (2).
 First Mathematics 8 (5), 24 (2), 25 (3).
 Second Mathematics 9 (5), 23 (3), 26 (4).
 First Military 5 (1), 7 (1).
 Second Military 6 (1), 8 (1).
 First Physics 509 (2).
 Second Physics 404 (5).
 First Psychology 5 (3), 6 (2), 7 (3), 9 (2).
 Second Psychology 2 (3), 3 (3), 4 (3), 5 (3), 6 (3), 8 (3), 9 (2).
 First Public Speaking 3 (2), 5 (2), 10 (2), 16 (2), 17 (1).
 Second Public Speaking 4 (2), 6 (2), 8 (1), 11 (2), 18 (1).
 First Soils 1 (3½), 4 (2), 6 (2), 8 (3), 13 (1⅔).
 Second Soils 2 (3½), 3 (2), 7 (1), 14 (3), 15 (2), 16 (2).
 First Veterinary 19 (1), 23 (2), 33 (3), 44 (2).
 Second Veterinary 22 (2), 24 (2).
 First Zoology 2 (5), 4 (4), 5 (3 or 5), 10 (3 or 5), 18 (2).
 Second Zoology 3 (5), 6 (1), 8 (2), 10 (3 or 5), 17 (3).

Remunerative and Instructive Labor.

The Agricultural Courses afford opportunity to do considerable work in the fields and about the barns and grounds. The compensation for services of this kind ranges from eight to fifteen cents per hour according to the merit of the work. Thus students are enabled not only to earn part of their expenses but also to materially strengthen the practical side of their education. A number of the strongest and most capable students are aided in finding employment during vacations with successful stockmen on good farms and in various other positions in line with their chosen work. Some who have taken a year of practical work in this way during their course have found it of

marked benefit, and it has enabled them to command more desirable and remunerative positions at the completion of their College course. Too much emphasis cannot be placed on a thorough understanding of the practical application of correct principles of agriculture.

Credits for Practical Work.

Agricultural students who, by previous agreement with the head of the department, do practical work on farms, horticultural or feeding or breeding establishments, beet sugar factories or forestry reservations, of recognized standing, during their course of study will be allowed credits on the following basis: Students who take practical work of the kind described under the direction of the proprietor and render competent and faithful service, will, on their return to College and on the presentation of a concise written report or resume of their observations and experience, be entitled to the following credits in the four-year courses in Agriculture:

For three months, five hours of elective work in the Junior or Senior year; for six months, eight hours; and for one year, ten hours; no more than five hours of which shall be credited in any one term of the College course.

Students must have at least six months of practical work before graduation, but credit will be given for such work only as stated above.

Department of Agriculture Scholarships.

The State Department of Agriculture offers scholarship prizes of \$200.00, \$100.00 and \$25.00, open to young men of the state not enrolled as regular or special students in any agricultural college, without barring the students of the special short courses in January. These scholarship prizes are awarded for the best judging live stock and corn annually at the state fair in accordance with the rules and conditions prescribed by the state department of agriculture governing the contest. These afford opportunities for young men to receive substantial aid toward paying the expenses of a college education, and some excellent students have come to the institution by means of these scholarships.

Mr. J. Ogden Armour, of Chicago, and the Rosenbaum Live Stock Commission Company, of Chicago, have donated prizes of \$5,000 and \$1,000 respectively for competition annually at the International Live Stock Exposition. At the last International the Iowa State College won seven of Armour scholarships of \$250 each. These scholarships are awarded annually to worthy students enrolled in the two weeks' short courses and in the regular four-year courses.

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Agricultural Experiment Station

CHARLES FRANKLIN CURTISS, DIRECTOR.

WILLARD JOHN KENNEDY, VICE-DIRECTOR.

The investigations of the Experiment Station are intimately related to the College work of instruction, as the problems occupying the attention of the Station are those that have a material bearing on the profit of the farm, and they are also those that are timely and in need of accurate investigation. Whether relating to the field, the feed lot or the laboratory, the aim is to investigate those questions which will have a practical relation to successful agriculture. Originality is made a feature of the work so far as is consistent with useful results, and in all instances the sole object is to throw light on the truth relating to the various principles and practices of the farm. The field work strongly supports the instruction of the College in regard to the varieties of grains and the methods of cultivation, thus enabling the student to become acquainted with the latest ideas relating to these. Tests are made of different varieties of fodders, grasses and grains, also of different systems of culture and various crops.

The experimental investigations with animals embrace a study of the value of different feeds for different features of animal production, the preparation of feeds, systems of feeding, also a study of different types of animals suitable for the requirements of the market. The object sought in this department of Station work is to indicate the manner in which the Iowa farmer, through the employment of animals, can realize the most from his farm products and add to the fertility of the farm. The Experiment Station has reached out in this way to a remarkable degree, bringing sheep from Mexico, Colorado and Scotland; cattle from Texas and Great Britain; horses from Wyoming, Montana and Europe, in its endeavor to thoroughly study this very important feature of the farmer's work. The data from these experiments is always accessible to the student who has the opportunity of observing daily the development of it at every stage.

The work of the Experiment Station is in the closest touch with the Dairy industry. The problems which practical men are constantly confronting and asking aid in solving are at all times objects of experimentation by the Dairy Section. The students not only see, but assist in carrying out these experiments. In this way they become acquainted not only with the problems to be solved, but with the methods employed in the investigations. This experimental work relates to the various problems of both butter and cheesemaking. The

results of this work, together with those of the bacteriological investigations, are daily used in class work.

The experimental work in Horticulture also affords the student an opportunity to study the results of the theory of the class room as practiced in the field. The connection of the Department of Horticulture with the State Horticultural Society is such that problems touching the commercial side of fruit growing receive the closest attention. Experiments are conducted in spraying for the prevention of fungous pests and injurious insects; also in fertilizing, pruning, and thinning; in nursery work and in plant breeding. The Station work thus equips the student with the practice and technique necessary to a thorough horticultural training.

The work of the Experiment Station has been increased by the addition of Forestry as a line of investigation. Methods of practical treatment of fence posts and other timbers to increase durability are being determined in co-operation with the United States Forest Service and farmers and stockmen throughout the state. The adaptability of various trees for different sections of the state and methods of germination and storage are being tested. To get more definite data in reference to germination of seed and growth of seedlings in nursery rows, tree seed has been distributed to farmers in twenty-five counties of the state.

A 200-acre dairy farm is stocked and equipped for experimental and educational work in this important line of work. This farm and its equipment afford excellent facilities for experimental work in the farm production side of the dairy industry. A poultry department has also been added for experimental and instruction work.

Agricultural Extension Department

PERRY GREELEY HOLDEN, SUPERINTENDENT.

The Agricultural Extension work was established permanently by enactment of the Thirty-first General Assembly of Iowa. This act provided for giving lectures and demonstrations on the growing of crops and fruits, on stock raising, dairying, land drainage and kindred subjects, including Domestic Science. Specific mention was made in this act of instruction in corn and stock judging at agricultural fairs, institutes and clubs and aid in conducting Short Courses of instruction at suitable places throughout the state. Under this act the Extension Department has been organized as a department of the Division of Agriculture.

The demand for the extension work was the natural outgrowth of the experimental and instruction work which has been carried on at the College by the heads of the departments in the Division of Agriculture. It was deemed best to separate it from the instruction and experimental work of the College and employ a special staff for extension work, to avoid interference with the duties of the heads of departments in conducting the College work. There is necessarily a close relation between all of the heads of departments and the extension work in corresponding lines. The Extension Department sustains the same relation to the Division of Agriculture and to the College as a whole, as the other agricultural departments, though this work is confined entirely to instruction and demonstrations given in various parts of the state remote from the College, with the exception of such assistance as members of that staff have rendered in connection with the two weeks' Short Course held annually at the College in January.

The extension work has met with general favor and been in wide demand. Demonstration work was conducted by members of the staff at meetings within the state, other than Short Courses, to the number of 844, outside the state to the number of 60. During the year Short Courses have been held at Sheldon, New Providence, Elkhorn, Fairfield, Mount Pleasant, Pella, Newton, Avoca, Mason City, Cedar Rapids, Spencer, Storm Lake, Correctionville, Manchester, Waterloo and Marshalltown. Special Domestic Economy Courses, in addition to the regular Short Courses, were held at Creston, Boone, Dallas Center, Denison, Cherokee, Clarinda, Leon and Sibley. The total enrollment for Short Courses not held at the College was 5,633.

Organization and History

The laws of the State of Iowa provide for the management and control of the State College of Agriculture and Mechanic Arts by the State Board of Education. This board consists of nine men nominated by the Governor and confirmed by the Senate. This Board appoints a Finance Committee consisting of three men who give their entire time to the management and control of the three state institutions of Iowa, under such rules and regulations as the State Board of Education may prescribe.

The act establishing "A State Agricultural College and Model Farm" to be connected with the entire agricultural interests of the State was passed by the Legislature of Iowa in 1858. This legislature also appointed a board of commissioners to buy a farm and erect a college building, and elected a board of trustees to select a faculty and organize a college.

In 1859 a farm of six hundred and forty acres situated near Ames was purchased for the use of the college.

In 1862 a bill was passed by Congress, entitled, "An act donating public lands to the several States and Territories, which may provide colleges for the benefit of Agriculture and the Mechanic Arts."

The income of the College from National and State sources is therefore expended in instruction, experimentation, and illustration in agriculture and in the mechanic arts, and in the underlying and related science and literature. All buildings are erected and all repairs thereon are made by the State of Iowa. The buildings are valued at about \$1,550,000. The College was formally opened on the 17th day of March, 1869.

THE SCOPE.

The Iowa State College of Agriculture and Mechanic Arts seeks to aid the young men and women in the acquirement of a higher education. Instruction is given in the culture studies and sciences, together with such experimental work as to enable the students successfully to engage in a practical profession. Throughout the several courses, the study of the textbook is supplemented by lectures, discussions, library work, and the practical experimental work of the laboratory. The instruction is not merely theoretical, but also practical, the student verifying and putting into practice in the laboratory the instruction received.

The Iowa State College offers four five year courses and fourteen four year courses leading to the following degrees:

FIVE YEAR COURSES,

Five year course in Mechanical Engineering, leading to the degree of Bachelor of Science (Mechanical Engineering), B. S. (M. E.).

Five year course in Civil Engineering, leading to the degree of Bachelor of Science (Civil Engineering), B. S. (C. E.).

Five year course in Electrical Engineering, leading to the degree of Bachelor of Science (Electrical Engineering), B. S. (E. E.).

Five year course in Mining Engineering, leading to the degree of Bachelor of Science (Mining Engineering), B. S. (E. M.).

FOUR YEAR COURSES.

Course in Agronomy, leading to the degree of Bachelor of Science (Agronomy), B. S. (Agn.).

Course in Dairying, leading to the degree of Bachelor of Science (Dairying), B. S. (Dairying).

Course in Animal Husbandry, leading to the degree of Bachelor of Science (Animal Husbandry), B. S. (A. H.).

Course in Horticulture and Forestry, leading to the degree of Bachelor of Science (Horticulture and Forestry), B. S. (Hort. and For.).

Course in Agricultural Engineering, leading to the degree of Bachelor of Science (Agricultural Engineering), B. S. (A. E.).

Course in Science and Agriculture, leading to the degree of Bachelor of Science (Science and Agriculture), B. S. (Sci. and Agr.).

Course in Veterinary Medicine, leading to the degree of Doctor of Veterinary Medicine (D. V. M.).

Course in Mechanical Engineering, leading to the degree of Bachelor of Science (Mechanical Engineering), B. S. (M. E.).

Course in Civil Engineering, leading to the degree of Bachelor of Science (Civil Engineering), B. S. (C. E.).

Course in Electrical Engineering, leading to the degree of Bachelor of Science (Electrical Engineering), B. S. (E. E.).

Course in Mining Engineering, leading to the degree of Bachelor of Science (Mining Engineering), B. S. (E. M.).

Course in Ceramics, leading to the degree of Bachelor of Science (Ceramics), B. S. (Cer.).

Course in General Science, leading to the degree of Bachelor of Science (B. S.).

Course in Domestic Economy, leading to the degree of Bachelor of Science (Domestic Economy), B. S. (D. E.).

Two year courses are also offered in Mining Engineering and Clay Working, and one year courses in Poultry Husbandry and Dairying, for the completion of which, certificates will be given. That many, who are

unable to take the full college course, may take advantage of the advancement being made in their chosen work, a two weeks' short course is now offered each year during the winter vacation in Stock and Grain Judging and Dairying. A School of Good Road Investigations is also held during each summer vacation. The interest in all of these short courses is becoming greater, the attendance is increasing, and the benefits to be derived from them are constantly increasing.

LOCATION.

The College occupies a delightful and healthful location upon high, rolling land in the west part of Ames, Story County. Situated at the junction of the north and south branch and the main double-track line of the Chicago & Northwestern Railroad, and connected with all the trunk lines of Iowa, Ames is easily accessible from all parts of the State. An electric railway connects Ames and the College with efficient service. The Fort Dodge, Des Moines and Southern Railway (electric), with stations on the campus, gives efficient service to the College, and excellent connections with the following trunk lines in Iowa: At Fort Dodge, with the Illinois Central and Chicago Great Western; at Kelley, with the Newton & Northwestern; at Huxley, with the Chicago, Milwaukee & St. Paul; at Des Moines, with the Chicago, Rock Island & Pacific, the Chicago Great Western, and the Chicago, Burlington & Quincy.

Ames is a most desirable town for wholesome college influences. Its people are thrifty, enterprising and cordial. The town has an excellent system of public schools, numerous churches, waterworks, and electric lights, and it also has a good city government. It is an inviting community for families who wish to educate their children and to enjoy a good environment at a reasonable expense. Ames and the College are on very cordial terms, and its citizens seek to promote the efforts of the students and the highest interests of the College.

THE COLLEGE GROUNDS.

Of the entire College domain of 1,200 acres, 125 acres are set apart for College grounds. These include the experimental plots, the young forestry plantations, the surroundings of the professors' dwellings, and the central campus with its beautiful winding walks and drives; its trees, shrubbery, and flower gardens; and its large and stately college buildings. The true principles of landscape gardening have been so faithfully observed in the gardening and in the location of buildings and drives as to make the entire campus a large and beautiful park.

BUILDINGS.

Thirty-three commodious buildings have been erected by the State for the exclusive use of the various departments of the College, besides the dwelling houses and the buildings for farm stock, machinery, and

work. All of these buildings are heated by steam, lighted by electricity, and supplied with pure water.

GENERAL BUILDINGS.

Central Building: The new Central Building, which has been erected on the site of the Old Main, accommodates the Executive Offices, and the departments of English, Modern Languages, Economic Science, History, Mathematics, Public Speaking, Botany and General Bacteriology. The building is of buff Bedford stone, built in the Roman Renaissance style, which style has also been adopted for the Engineering and new Agricultural Halls. The building, completed and furnished, cost about \$375,000.

Morrill Hall: Morrill Hall, one of the oldest of the College buildings, was named in honor of Hon. Justin S. Morrill, the originator of the "Land Grant" for Colleges of Agriculture and Mechanic Arts. It is of deep red brick with stone, brick, and terra cotta trimmings. In it are College Chapel, Library, Zoological Museum, lecture rooms, and laboratories.

Domestic Technology Building: This is a two story, with basement, fireproof building. The basement contains the lockers, reading room, and class rooms of the Domestic Economy Department. The first floor is devoted to offices and the laboratories for the Domestic Art work. The second floor contains the laboratories for the Domestic Science classes and the art room. It is expected that the building will be ready for occupancy by December 1, 1910.

Margaret Hall: Margaret Hall, the home of the young women of the College, occupies one of the most pleasing locations on the campus. It is built of brick, roofed with slate, provided with steam heat, electric lights, baths, and a large parlor. The hall accommodates about one hundred women, to whom the rooms are assigned in the order of their application. The privilege of rooming in Margaret Hall is reserved for regular students. In connection with the Hall there is a boarding club for the young ladies. Young women residents of Margaret Hall are required to board in this club. The young women are under the direction of an efficient matron.

The Campanile: A detached tower 110 feet in height is built of buff brick with terra cotta trimmings. This tower stands practically in the center of the campus. It contains a Seth Thomas tower clock with four dials, each seven feet in diameter. The tower also contains the Margaret Chimes presented to the Iowa State College by Dr. Edgar Williams Stanton in memory of his wife, Margaret McDonald-Stanton. This chime was manufactured by John Taylor & Company, Loughborough, England. It has ten bells, the combined weight of which is 15,000 pounds.

Chemical Hall: A three story brick building furnished with

steam heat, water, gas, and laboratory equipment, accommodating 600 students in Chemistry.

Sanitary Hall: A two story brick building, containing offices, kitchen and dining room for the hospital patients, and rooms for the sick and convalescent.

Alumni Hall: This is a brick building, 87 by 48 feet, colonial in style, with three large porches. It has three stories and a basement; in the basement there are the cafe and swimming pool; on the first floor, there are reception rooms and reading rooms for the Young Men's and the Young Women's Christian Associations; on the second floor there are the assembly room and the Bible class rooms; and on the fourth floor there are three large parlors and fourteen sleeping rooms. This building was built by private subscriptions.

Music Hall: This is a two story brick building, fitted up with apparatus and instruments for practice and instruction.

Central Heating Plant: A central heating and power plant furnishes heat and power for all College purposes with very satisfactory results in comfort, economy, and cleanliness.

Custodian's Office: This is a small two story brick building about 40x36 feet. It is used for offices of the Custodian and the Military Department.

Book Store and Post-office: This is a small one story brick building about 44 x 55 feet, which contains the College book store and the branch government post-office known as Station "A."

Dwelling Houses: There are also on the campus eighteen comfortable dwelling houses occupied by professors' families, or by foremen and employees.

AGRICULTURAL BUILDINGS.

Hall of Agriculture: The Hall of Agriculture is 234x78 feet, and four stories in height. It is fireproof throughout, of the best modern construction, and arranged with suitable conveniences and facilities for thoroughly efficient high-grade work in agricultural instruction and investigation. This building, with its equipment complete, cost about \$350,000.

The Annex of the Hall of Agriculture: This contains the assembly room, which is semi-circular in form, the base being ninety-six feet in diameter. The annex is fireproof throughout and of the best modern construction.

Agricultural Engineering Hall: This is a four story building, the lower stories of stone and the upper of brick. It contains recitation rooms of the divisions of Agriculture and of Veterinary Science, offices of the Experiment Station, and sewing rooms of the Domestic Economy Department.

Agricultural Engineering Annex: This is a four story, fireproof building, built of steel and pressed brick, costing, when equipped, about \$70,000. It accommodates the workshops, tool rooms, blacksmith shop, carpenter shop, drafting room, reading room, rooms for the study and exhibition of various farm implements, offices and class rooms, bulletin rooms, and photographic department.

Dairy Building: This is a three story building built of pressed brick and trimmed with Bedford stone, containing factory, butter, and cheese rooms, bottling room, refrigerators, lunch room, offices, research laboratory, farm dairy room, students' testing laboratory, lecture room, dairy reading room, and bacteriological laboratory for research and investigation.

Horticultural Laboratory: This is a two story brick building connected with the greenhouse. The main floor, accommodating fifty students, is especially fitted for the study of fruits. The building is equipped with two refrigerators, one for experimental work in cold storage and the other for storing fruits for class purposes. The second floor contains the horticultural museum and facilities for photography.

Greenhouses: The present plant contains 10,000 square feet under glass. The houses are of cypress construction, supported by a steel structure. They are heated by steam, operated on the Paul system, with varying temperatures for the propagating house, the growing houses, and the seed testing houses. The houses also include four commodious work rooms used in potting, transplanting, and other necessary work.

Horse Barns and Stock Pavilion: The barn, built of brick, with a slate roof, is for horses, for the storage of grain, and for general farm purposes. The Stock Pavilion, also of brick, is circular in form, and is well heated and lighted, accommodating several hundred students at a time, and affording first-class advantages for stock judging and animal husbandry.

Station Barn: The Experiment Station barn is one of the best and most modern buildings of its kind to be found anywhere in the world. It is veneered with buff pressed brick, has a slate roof, paved brick floors, and is in every respect entirely fireproof. The building is devoted to the housing of beef and dairy cattle and horses and to the storage of vehicles and machinery. It is also used as a storage and grinding room for feed, and as seed rooms for the drying of corn and the storage of grain and feed stuffs used in experimental work.

Judging Pavilion: In connection with the experimental barn, there is a two story octagonal judging pavilion. It is built of buff pressed brick with a slate roof. The lower story is used for stock judging, and the upper for grain judging. This building, thoroughly equipped in every way, is conceded to be the best building of its kind on the continent.

Other Buildings: Stables, barns, and seed houses sufficient for

the requirements of the farm, are conveniently grouped near the College campus.

VETERINARY BUILDINGS.

The New Hall of Veterinary Medicine: The New Hall of Veterinary Medicine, the erection of which will begin this year, is to be 144x176 feet, three stories in height. The large interior court is to be used for clinical purposes. New and modern equipment will be installed throughout.

Veterinary Hospital: This is a three story brick building, fitted with well lighted single and box stalls, operating rooms, office and pharmacy, resident surgeon's room, dissecting room, etc. It is well furnished with all the surgical instruments of modern construction, operating table, and other important conveniences for clinical as well as for general hospital work.

ENGINEERING BUILDINGS.

Engineering Hall: The Engineering Departments occupy the new Engineering Hall. This is a fireproof building in which all the engineering departments have offices, recitation and lecture rooms, laboratories and engineering museum. It is of Bedford stone, has plate glass windows, and modern conveniences and furnishings throughout. This building, costing \$220,000, is the best engineering building west of the Mississippi river.

Engineering Annex: This is a two story fireproof building, 50 x 208 feet, completed in the fall of 1909. The total cost is \$41,000. The first story is devoted to the use of the Electrical Engineering Department, the Mining Engineering Department and the Surveying Department. In it are located the dynamo engineering laboratory, assaying and clay working rooms for the Mining Engineering Department, and instrument room and class room for the Surveying Department. The second story contains additional rooms for the Mining Engineering Department, the remainder being given up to drafting rooms and class rooms for the Electrical, Civil, and Mechanical Engineering Departments. A third story is being held in reserve, to provide additional accommodations as the constant growth of the department demands.

The Ceramics Building: The last Legislature provided an appropriation of \$15,000 for the construction of a new Ceramics building. This was completed in the fall of 1909. It is a three story, fireproof building, 70x50 feet, containing clay working rooms, kiln rooms, and other adequate accommodations for the Ceramics work. The chemical part of the Engineering Experiment Station work is done in this building.

Structural and Hydraulic Laboratory: This is a three-story stone

and brick building, which has been entirely remodeled and rebuilt into a modern laboratory building, fireproof except for the roof. The Hydraulic laboratory occupies a basement wing lined with enameled brick, and also the floor above it. There are two large structural laboratory rooms, one large cement laboratory room, four computing and research rooms, five instrument rooms, and offices. The Engineering Experiment Station and the Structural Testing Laboratories are also located in this building.

Power Station: This is a one story brick building, 36x120, devoted to the lighting and pumping plants of the College, and to the heating plant for the engineering buildings. All of the equipment is used for purposes of instruction, as far as this does not interfere with gas engine laboratory work is made available. The building contains an engine and dynamo room, a boiler room, and a pump room.

Foundry: This is a one story brick building, 38x78 feet, containing the equipment for instruction in foundry practice. The roof trusses are of steel and are calculated to carry traveling cranes for transferring heavy castings and forgings.

Forge Shop: This is a one story brick building, 38x78 feet, with a store room at one side in an addition. The building was constructed in 1906. It contains equipment for instruction in forge shop practice. The roof trusses are of steel and the roof is of slate.

Pattern Shop: This is a one story brick building, 38x120 feet, devoted to the work of instruction in bench work, wood turning, and pattern work. A fireproof room is provided for the storage of patterns.

Locomotive Laboratory: For the temporary protection of the locomotives donated to the Department of Mechanical Engineering by the Chicago & Northwestern railway and by the estate of S. H. Mallory, a corrugated iron structure has been provided.

Machine Shop: This is an entirely new building, 150x45 feet, just erected. It is practically two stories high, and, besides a large machine shop, surrounded by a gallery, it contains laboratory, locker room, office, class room, and tool room. This building is one of the best college engineering shops in the country.

ACCREDITED SCHOOLS.

High schools and academies may be placed on the accredited list, by action of the Faculty, upon recommendation of the Committee on Entrance Requirements and Secondary Schools. The complete list of the fully accredited schools of Iowa is not published in this catalogue, but will be found in the Iowa Educational Directory. We desire the fullest co-operation and consultation with the High Schools of the state. All questions with regard to the inspection or relation of any school to the College should be addressed to Prof. Forest C. Ensign, Inspector of Secondary Schools for the Board of Education.

Admission to the College

All communications with regard to the admission of any student to the College should be addressed to the Registrar. The Registrar will determine the value of all credentials and will notify the applicant of their acceptance. He will also assign the applicant for admission to his position in the course desired. This assignment will be conditioned upon the student's doing creditable work.

Applicants for admission to the freshman class should be at least sixteen years of age.

A student may enter the College at the beginning of either semester. The regular classes begin with the opening in September and the student is urged to commence at that time. The freshman subjects are, however, taught in both semesters. The Freshman work will be of such grade that a graduate of an accredited school can reasonably be expected to be prepared to carry it creditably. The responsibility of maintaining himself in the Freshman class rests, however, upon the student, and it is urged upon all that they review thoroughly, just before entering, at high school or elsewhere, their Algebra and English Grammar. Students desiring admission should examine the requirements for admission and the methods of obtaining the thirty credits for admission.

REQUIREMENTS FOR ADMISSION TO THE SEVERAL DIVISIONS OF THE COLLEGE.

The requirements for admission are stated in terms of credits. The term credit means the equivalent in a given subject of five from forty to fifty-minute recitations per week for a term of eighteen weeks, adequate time being given to the preparation of each lesson. Students desiring admission to the Freshman year must present thirty credits. Of these, certain are required and the balance may be elective.

CREDITS REQUIRED FOR ADMISSION.

	Division of Agriculture. Credits.	Division of Veterinary. Credits.	Division of Engineering. Credits.	Division of Science. Credits.
Algebra	3	3	3	3
Geometry, Plane	2	2	2	2
Geometry, Solid			1	
English	6	6	6	6
History	2	2	2	2
*Language—				
German,	4	4	4	4
French,				
Spanish, or				
Latin,				
Science	1	1		1
Electives—				
Twelve credits	12	12	12	12
from the following				
list of electives				
	—	—	—	—
Total credits				
for admission	30	30	30	30

*Students may be admitted without Foreign Language under the following conditions:

1. The student must offer all of the required credits except the four in Foreign Language, together with sufficient elective credits to make a total of thirty.

2. The language requirements must be made up before graduation. This will ordinarily require, if taken in College, extra work to the extent of five hours a week for one year. Such extra work will not be credited as part of the credit hours required for graduation in the several courses. Opportunity for making up deficiencies in language will be offered by the College.

In the divisions of Science and Engineering, no foreign Language course of less than two credits will be accepted for required entrance credits in language. Students offering Foreign Language for admission credits are urged to offer four credits in one language, preferably a Modern Language.

List of Elective Credits.

Subject.	Credits.	Subject.	Credits.
Agriculture	1	English	1 or 2
Astronomy	1	Geology	1 or 2
Bookkeeping	1 or 2	German	2 or 4
Botany	1 or 2	Greek	2 or 4
Business Arithmetic.....	1 or 2	History	2 or 4
Chemistry	1 or 2	Latin	2 or 4
Civics	1 or 2	Manual Training.....	1, 2, or 3
Commercial Geography.....	1	Mathematics	1 or 2
Drawing	1 or 2	Mechanical Drawing.....	1, 2, or 3

Subject.	Credits	Subject.	Credits.
Mental Arithmetic	1	Political Economy	1 or 2
Optional	2	Spanish	2 or 4
Physics	2	Stenography	1 or 2
Physical Geography	1 or 2	Zoology	1 or 2
Physiology	1 or 2		

Limitations: Not more than four elective credits will be accepted in Foreign Language or in any other subject. No Foreign Language course of less than two credits will be accepted from students presenting only one Foreign Language.

Optional Subjects: An optional subject is any subject of the student's High School course not specified in the list of elective subjects.

METHODS FOR OBTAINING THE THIRTY CREDITS FOR ADMISSION.

There are four methods of obtaining the necessary credits for admission to the Freshman class:

- A. Admission by transfer from other Colleges and Universities.
- B. Admission by certificate from a fully accredited High School.
- C. Admission by Examination.

A. Admission by Transfer From Other Colleges and Universities.

A student who has entered another College or University of recognized standing and asks admission to this College, must present a certificate of honorable dismissal from the institution from which he comes. He must also present an official statement of the subjects upon which he was admitted to such institution. Provided it appears that the institution has Entrance Requirements equal with this College and that the certificate shows clearly that the student has been required to meet fully the thirty credits required by this College, he will then be admitted. For the acceptance of standings from other Colleges or Universities to apply as college work in this College, see Acceptance of Advanced Standings.

B. Admission by Certificate From the Fully Accredited High Schools.

Graduates of the fully accredited High Schools of Iowa who meet fully the requirements for admission to the Freshman class, will, upon presentation of the proper Uniform Certificate, be admitted to the College without examination.

Graduates of schools fully accredited by the Colleges of other states which have as high a standard of entrance requirements as this institution, will also be admitted as Freshman upon presentation of

certificate of graduation, accompanied by Uniform Admission Certificate.

Superintendents and Principals are urged to send to the Registrar immediately upon the close of the school year, the Uniform Admission Certificate of each graduate intending to enter the College at the beginning of the ensuing College year. If, on inspection, the certificate is found satisfactory, the applicant will be forwarded a certificate entitling him to admission without examination. Uniform Admission Certificates may be obtained by teachers and students upon application. Candidates for admission may apply to the Registrar for the Uniform blank. The Certificate must show the grade of work done and textbooks used in the subjects required for entrance, with a definite statement of the year of the High School in which the subject was taken, the number of recitations per week, and the number of weeks the subject was pursued during the High School Course.

Diplomas of graduation will not be accepted for entrance unless accompanied by a Uniform Certificate as stated above.

All Uniform Certificates should be filed with the Registrar not later than the second Monday in August or the first Monday in January.

C. Admission by Examination.

Students desiring to enter by examination will be given such examinations in any subject required for entrance, upon presentation of satisfactory evidence of their having devoted sufficient time to the preparation of such subjects.

Students desiring to enter by examination will be expected to pass examinations in the following required and elective subjects;

Required Subjects: The subject matter to be covered is according to the material found under the general statement concerning entrance credits, page 95, which gives a synopsis of the amount and kind of work required for entrance.

Algebra.

Plane Geometry.

English,

Composition and Rhetoric.

Literature, American and English.

Review Grammar.

Languages.

Two years' work in any one of the following or one year's work in two different languages:

Latin.

German.

French.

Spanish.

History.

Solid Geometry or Science.

For the Agricultural, Veterinary, or Science Division, one science, Botany preferred. For the Engineering Division, Solid Geometry.

Elective Subjects: Divided into two classes; those which require the equivalent of one year's work in High School, five hours per week, here listed as major subjects; and those which require one semester's work, five hours per week, here listed as minor subjects.

The candidate will be required to pass examinations in six major subjects; or, for every major subject in which he does not take an examination, he will be required to take examinations in two minor subjects.

Major Subjects.

Physics.
Chemistry.
Zoology.
Physiology.
Physiography.
Economic Science.

Minor Subjects.

Civics.
Drawing.
Agriculture.
Review Arithmetic.
Commercial Geography.
Bookkeeping.
Geology.
Manual Training.
Optional.

Entrance Examination Periods.

Examinations for entrance to College will be conducted at the opening of each semester on the Tuesday and Wednesday preceding classification.

Tuesday.

- 8 to 10 A. M.—Public Speaking. Room 308, Central Building.
- 10 to 12 A. M.—English. Rooms 1 and 3, Central Building.
- 1 to 3 P. M.—Language. Room 119, Central Building.
- 3 to 5 P. M.—Botany. Room 312, Central Building.

Wednesday.

- 8 to 10 A. M.—Mathematics. Room 221, Central Building.
- 10 to 12 A. M.—History. Room 208, Central Building.
- 1 to 3 P. M.—Civics. Room 102, Central Building.
- 3 to 5 P. M.—Language. Room 119, Central Building.

The Registrar will arrange for the other examinations required by the candidates for admission.

SPECIAL STUDENTS.

Students taking special work in any of the College courses must be at least twenty years of age, must give good and satisfactory reasons for desiring such classification, and must furnish satisfactory

evidence that they are thoroughly prepared to pursue the work chosen. Permission to take such special course and the subjects included therein depends upon the approval of the President of the College and the Dean or Head of the Department in which the student seeks enrollment.

(1) Permission to take a special course will not be granted to students until they have completed the Freshman year of some one of the courses offered, and then only for a period not to exceed two years except on the recommendation of the Faculty of the division in which the student is enrolled and on approval of the President of the College.

(2) All special students shall pay additional fees for special work of ten dollars for each semester.

Special and Short Course students are subject to the same rules governing conditions on back work that apply to all other students. Students wishing to change from a regular to a special or short course, either in the same or another department, will be required to remove all conditions on back work. Special students, as well as regular students, are subject to the conditions given under Requirements for Admission.

It is the theory of special classification that students should be particularly strong and well prepared to do thorough work in the studies they elect. A high standard of scholarship will, therefore, be required of all who are thus classified.

SHORT COURSE STUDENTS.

Worthy students of good standing, over twenty years of age, not prepared to meet the entrance requirements of the Freshman year may be admitted as students of a short course not to exceed two years without examination, provided they give evidence of satisfactory preparation to carry such work successfully. Students will be required, however, to present a certificate covering their preliminary education. Short Course students who have not had previous work of collegiate grade will be required to take the first year of their work from Junior College studies.* During the second year they may be admitted to the Senior College studies in accordance with the rules governing admission to each study or course.**

*Special Interpretation for Agricultural Students.—An exception to this rule will be made in case of Animal Husbandry 11 and 12. These courses may be taken the first year in lieu of Animal Husbandry 2 and 3, which cannot be taken until the work in Animal Husbandry 1 and 2 has been completed.

**For conditions of admission to any course, see the description of the course of study.

FEES AND EXPENSES.

The entire expenses of a student need not exceed \$300.00 per College year.

Tuition.—No charge for tuition is made to the students from the state of Iowa. To the non-residents, a tuition fee of \$50.00 per year is charged.

Incidental Fee.—The regular incidental fee for the semester is \$10.00, but all students who classify during the classification period, Thursday, Friday, and Saturday, before College work begins, will be charged only \$8.00 per semester.

Laboratory Fees.—Laboratory fees at the actual cost of breakage and usage are charged to the students, the Treasurer's receipt for such fee being required before the students are admitted to laboratories. For the amount of the fee in any course the student should refer to the description of courses, under the department in which the course is taught (see index).

Special Student's Fee.—All special students shall pay an additional fee for special work of ten dollars per semester (see rule under Special Students).

Board and Room.—About one hundred young women can secure rooms in Margaret Hall. The privilege of rooming in this building is reserved for regular students. Students rooming in this building furnish their own bedding and all furniture except bedsteads, dressers, and tables. Each girl pays \$9.00 per semester for room, and a sum not exceeding 55 cents per week for lighting, heating, and incidentals.

As security for the payment of bills, all students living in College buildings are required to deposit \$10.00 with the Treasurer, which deposit will be returned at the final settlement at the close of the semester. All the bills for each month must be settled at the Treasurer's office by the second Saturday of the following month.

All other students can secure furnished rooms and board in clubs or private families adjacent to the College grounds at from \$3.50 to \$4.50 per week.

The College Custodian, office in old office building, should be consulted by all new students, concerning rooms and rooming places, that undesirable rooms and houses may be avoided. For sanitary or any other reasons the College authorities reserve the right to forbid students from rooming in any particular house.

No group of young women students may establish a "house" or "home" without the full knowledge and approval of the President and the Dean of Women, nor make any definite plans in such direction. No young woman may become a resident of a sorority house until after she is an initiated member of the sorority.

The young women residents of Margaret Hall are required to board at the Margaret Hall boarding club.

Hospital Fee.—All students living in College buildings, and such others as desire to do so, pay a Hospital fee of \$2.50 per semester. (See College Hospital).

Diploma Fee.—A diploma fee of \$5.00 is payable before graduation.

Text Books.—All text books and stationery may be purchased at the College Book Store at about 20 per cent below the average retail price.

ADVANCED STANDING.

Students of other colleges will be admitted to advanced standing in this college under the following conditions:

First, they must present a letter of honorable dismissal;

Second, the entrance requirements to the college must be fully satisfied (see admission from other colleges under Entrance Requirements);

Third, students of other colleges will be admitted and granted such credits as their work will justify. Work of recognized merit that has been taken at Colleges and Universities of good rank and standing will be credited for an equivalent amount of work so far as it applies in any of the courses offered at this College. Students taking up work in this way will consult the Heads of the Departments to ascertain the credits to be allowed. These credits may, at the option of the Heads of the Departments, be conditioned on satisfactory work by the student during the first term in College;

Fourth, standings accepted by any Head of Department from any other College or University, shall be certified to the Recorder as "Accepted from College" or "Accepted from University," and these acceptances, after being verified by the Recorder, shall be so recorded in lieu of the regular standings;

Fifth, it is required that all credits from other institutions be sent by the proper officers of such institutions, duly certified, to the Recorder of this College, such certificates to include the number of weeks the student has pursued the studies in question and the number of hours' credit received in each term, as well as the portion of the subjects covered.

CLASSIFICATION AND STANDINGS.

Junior and Senior College.—The students are now classified in "Junior and Senior Colleges." The Junior College is composed of all students in the Freshman, and Sophomore years: the Senior College, of all students in the Junior and Senior years.

Amount of Work.—The amount of work in each course is expressed in hours, *an hour* meaning one recitation or its equivalent per week throughout the semester. It is considered that one hour's recitation or lecture will require as much time in the preparation, and hence is equivalent to a three-hour laboratory and receives the same credit. Any two-hour laboratory period is equivalent to two-thirds of a three-hour laboratory.

Number of Hours.—No student shall be allowed to classify in more hours than are specified in the catalogue for the semester of the course taken unless he has an exceptionally high record in his previous college work. The taking of such additional work is subject to the approval by the Dean under whom the student is classified and the Heads of the Departments in which the student is classified.

In general, students failing in any portion of a term's work will not be allowed to take full classification for the next semester.

Classification.—No student shall be admitted to any class or dropped from it, except by authority of the Classifying Officer.

Conflicts.—Students shall not classify in conflicting studies without the approval of the Classifying Officer and Heads of the Departments in which the student wishes to enroll.

Standing.—All the standings are based on the scale of 100. The passing grade is 75. A student receiving from 60 to 74 per cent inclusive in any course is conditioned, and allowed to make up the condition under the direction of the head of the department.

Back Studies.—Students shall be classified in back studies in all cases in which such studies are taught, subject to the first rule under Number of Hours. Any exception to this rule must be for good and sufficient reason, approved by the President of the College and the Dean or Head of the Department in which the student is enrolled.

No student shall be considered a candidate for graduation who has not at the beginning of the second semester of the Senior year completed his work to within the maximum number of hours regularly allowed in his course for that semester. If the uncompleted work is not offered in the second semester, it shall be passed and reported to the recorder not later than April 1st.

EXAMINATIONS IN BACK WORK.

Examinations for back work for matriculated students will be conducted at the opening of each semester, on the Tuesday and Wednesday preceding classification days.

TUESDAY.

- 8-10 A. M.—Farm Crops....Farm Crops Lecture Room, 307 Hall of Ag.
- 8-10 A. M.—Mining Engineering.....Room 306, Engineering Hall
- 8-10 A. M.—Zoology.....Zoological Lecture Room

- 10-12 A. M.—English.....Rooms 1 and 3, Central Building
 10-12 A. M.—Civil Engineering.....Room 312, Engineering Hall
 1- 3 P. M.—Mech. Engineering.....Rooms 204 and 205, Eng. Hall
 2- 4 P. M.—**History**.....Room 208, Central Building
 3- 5 P. M.—Public Speaking.....Room 308, Central Building
 3- 5 P. M.—Electrical Engineering.....Room 207, Eng. Hall

WEDNESDAY.

- 8-10 A. M.—Horticulture.....Hort. Lecture Room 208, Hall of Ag.
 8-10 A. M.—Chemistry.....Room 29, Chemical Hall
 8-10 A. M.—Mathematics.....Room 221, Central Building
 8-10 A. M.—Animal Husbandry...An. H. Lecture Room 117, Hall of Ag.
 10-12 A. M.—Economics.....Room 222, Central Building
 10-12 A. M.—Dairying.....Dairy Building
 10-12 A. M.—Botany.....Room 312, Central Building
 1- 3 P. M.—Civics.....Room 102, Central Building
 1- 3 P. M.—Mech. Engineering.....Rooms 204 and 205, Eng. Hall
 1- 3 P. M.—Domestic Economy.....History of Art Room
 2- 4 P. M.—Modern Language.....Room 119, Central Building
 2- 4 P. M.—Agricultural Eng..Agr. Eng. Lecture Room, Agr. Eng. Hall
 3- 5 P. M.—Soils.....Soils Lecture Room 8, Hall of Agr.
 3- 5 P. M.—Physics.....Room 207, Eng. Hall

DEPARTMENTS MAINTAINED.

Agricultural Chemistry,	History,
Agricultural Engineering,	Horticulture,
Agronomy,	Literature and Rhetoric,
Animal Husbandry,	Mathematics,
Bacteriology,	Mechanical Engineering,
Botany,	Military Science,
Chemistry, General and Applied,	Mining Engineering,
Civil Engineering,	Music,
Dairying,	Modern Languages,
Domestic Economy,	Physics and Illuminating Engin'ing.
Economic Science,	Psychology and Ethics,
Electrical Engineering,	Public Speaking,
English,	Science and Agriculture,
Farm Crops,	Soils,
Forestry,	Veterinary Science,
Geology,	Zoology.

GOVERNMENT.

The relations of our College buildings, and the nature of the exercises, complicated as they are, by laboratory work, shop practice, and labor, make order, punctuality, and systematic effort indispensable.

The institution, therefore, offers no inducement to the idler or the self-indulgent. All who are too independent to submit to needful authority, too reckless to accept wholesome restraint, or too careless to take advantage of their opportunities, are advised not to come. The discipline of the College is confined mainly to sending away those who prove, on fair trial, to be of this class.

MANUAL LABOR.

The following regulations in regard to manual labor have been adopted by the Board of Trustees:

1. The manual labor of students is divided into two kinds: viz., uninstructional labor, which shall be paid for in money; and instructional labor, which shall be compensated by the instruction given and the skill acquired.

2. Uninstructional labor shall comprise all the operations in the workshop, the garden, upon the farm, and elsewhere, in which the work done accrues to the benefit of the College, and not to that of the student. Instructional labor shall embrace all those operations in the workshop, museum, laboratories, veterinary hospital, experimental kitchen, upon the farm, garden and experimental stations, in which the sole purpose is the acquisition of knowledge and skill.

3. Students shall engage in instructional labor in the presence of the professor in charge, and under his instruction according to the statement made in each of the courses of study.

The compensated labor furnished by the Divisions of Agriculture, of Veterinary Medicine, and of Engineering, is given by each to its own students and is eagerly sought. The "details" of compensated labor supplied by the needs of the various departments are given to the most faithful and meritorious students in each department. Uninstructional labor is paid for according to its value to the College, but no student should expect to pay the main part of his expenses by labor while here. The College cannot furnish the work, and, even if it could, the student's time is *needed chiefly for study*. Still, many worthy and industrious students pay a considerable part of their expenses by labor, over \$4,000 being paid out by the College thus each year to students and post-graduate assistants.

GRADUATING THESIS.

All candidates for graduation in the Engineering and Agricultural courses are expected to present a satisfactory thesis.

The subjects for theses shall be selected under the direction of the professor in whose department they are written, and submitted to the Thesis Committee, with signed approval of the professor, on or before the first Monday in October.

It is expected that each thesis shall represent an amount of work

equivalent to at least one exercise per week through the Senior year; that it shall show the result of the student's personal study or investigation and be throughout original in matter and treatment so far as the nature of the subject will permit; that it shall be prepared under the supervision of the professor in charge, the student making frequent reports of progress and having an outline of matter ready for approval by the first week of the last semester.

The complete thesis shall be submitted to the Thesis Committee on or before May 25th.

COLLEGE HOSPITAL.

The actual sanitary condition of the College is excellent. The buildings are situated on high ground with good natural drainage. The water supply is exceptionally pure and abundant. The sewer system and sewerage disposal plant are the best that modern sanitary engineering can devise. Nevertheless in this, as in other like institutions, whose students are drawn from a wide territory, various diseases are brought by the students themselves. In order to control epidemics and properly to care for other cases of illness or injury, two hospitals are provided. These hospitals are under the charge of the College Physician, assisted by a professional nurse, a competent housekeeper, and a student hospital steward.

The expenses of the hospitals are defrayed from a fund accruing from the hospital fees paid by students. A hospital fee of \$2.50 per semester is required of all students living in College buildings. The privileges of the hospitals are also extended to students not rooming in the College buildings, provided: 1st, that the physician shall be paid for calls at their residences; and, 2d, that the usual hospital fee shall be paid within the first ten days of the student's arrival. Students not making the hospital deposit will be admitted to the hospital upon the basis of \$10.00 per week, within the discretion of the college physician. The hospital fee insures to the payer thereof, medical attendance, nursing, and medicine, in illness or accident; and consultation and medicine for minor ailments in accordance with the regulations herein published. The charges named are based upon the probable actual cost of medical attendance and hospital service, and the fund created is carefully devoted to these purposes. The College can not assume any liability beyond the extent of the fund so created. The hospital has proved to be a great blessing to the students.

The following regulations apply to the privileges of the hospital:

1st. Students entering the hospital shall be charged \$3.00 per week for board, room, light, and heat. But for any time in excess of three consecutive weeks per term spent in the hospital, an additional charge above that mentioned shall be made of \$4.00 per week.

2d. In case a special nurse or physician is employed, the expense

shall be borne by the particular patient, the selection of such nurse or physician to be approved by the College physician.

3d. The College assumes no responsibility whatever in case of smallpox; nor shall the privileges of the hospital be extended to such cases.

4th. The President and the College physician may require of students entering the college a certificate of a reputable physician showing successful vaccination.

5th. The College physician is authorized to exclude from the College dormitories and recitation rooms any person afflicted with a contagious disease.

COLLEGE LIBRARY.

The College Library, consisting of over 30,000 volumes and of about 10,000 pamphlets, is chiefly a library of reference, containing standard and technical works bearing particularly upon the lines of study pursued in the College. Magazines, periodical literature bearing upon the special work of the students, and daily papers are furnished for the use of the students. The reading room of the library is open eleven and one-half hours daily except Sunday, when it is open three hours. Personal assistance will be given by the librarian and her assistant to any who desire help in reference work.

A few years ago the College received by bequest about 1,500 volumes pertaining to Engineering and Economics from the library of the late Geo. W. Catt. This Engineering Library, with that section of books from the general collection, has been made a Departmental Library, located in Engineering Hall. An Agricultural Library has been established, also, in the New Hall of Agriculture.

RELIGIOUS LIFE AT THE COLLEGE.

ORANGE HOWARD CESSNA, CHAPLAIN.

M. H. BICKHAM, GENERAL SECRETARY, Y. M. C. A.

MISS FLORENCE ARMSTRONG, GENERAL SECRETARY, Y. W. C. A.

Although we have here a state school, and hence one non-sectarian, the College life is dominated by religious influences.

The Young Men's and Young Women's Christian Associations, Bible Study Classes, and Mission Classes, consisting of members from both faculty and student body, have a helpful influence not only upon the religious but also upon the social life of the College. The members of the Associations assist in the reception of the new students and in the maintenance of religious work.

The work of each Association is under the direction of a general secretary. These two Associations are now located in their new home, "Alumni Hall," which was constructed at an expense of \$60,000.00, by

funds donated by the alumni, students, instructors, citizens, and friends. This home is the center of the religious and social life of the College and as a building for such purposes it is not excelled in the West.

The faculty and students assemble daily in the Chapel at 9:40 A. M. for public worship. On each Sunday morning at 10:45, Chapel exercises are conducted by some prominent clergyman invited for the occasion. In all these services, the object is to emphasize the principles of morality and of the Christian religion.

There are nine different denominational churches in Ames, all of which are closely in touch with the students and cordially invite them to take part in all religious services.

ALUMNI ASSOCIATION.

The Alumni Association of the Iowa State College was organized in 1876. Its purpose is to promote the highest interest of the institution and to increase friendship and sympathy among students and alumni.

The present officers of the Association are: E. W. Stanton, '72, Honorary President; J. F. Porter, '84, President; B. W. Crossley, '07, Secretary; Mrs. Julia W. Stanton, '88, Treasurer; Mrs. Mary McDonald Knapp, '83, Historian; Mrs. M. K. Smith and Dr. E. W. Stanton, Executive Committee; and G. W. Patterson, '09, Business Manager of *Alumnus*. The annual business meeting and banquet are held on Wednesday and Thursday of Commencement Week. A local association was organized in April, 1903, in order to arrange for the annual meetings and to keep the alumni in close touch with one another. Branch associations have been organized in Des Moines, Washington, D. C., New York, Pittsburg, Chicago, Philadelphia, Schenectady, St. Louis, Kansas City, and Seattle.

Alumni Hall adds much to the Association, as it affords a place where the alumni may meet when visiting their Alma Mater.

COLLEGE PUBLICATIONS.

1. Catalogue, published in February, and giving general information about the College and its several departments.

2. College Compendium, an illustrated catalogue of the school.

3. Special announcements of the Agricultural, Veterinary, and Engineering divisions, and of the Short Course and Good Roads School, one bulletin being published each month.

4. Bulletins, recording the results of experimental studies carried on by the Agricultural and the Engineering Experiment Stations.

STUDENT AND ALUMNI PUBLICATIONS.

1. The Student, a weekly paper, published by a staff elected from

the student body and devoted to the recording of such matters as pertain to the interest and welfare of the school.

2. The Bomb, an annual published by the Junior Class.
3. Iowa Agriculturist, published monthly by the Agricultural Club of the Iowa State College.
4. Iowa Engineer, published bi-monthly by the Engineering Association.
5. The Alumnus, a monthly publication, devoted to and published by the Alumni Association.

LITERARY SOCIETIES.

The work of the eleven literary societies serves not only to supplement the social and literary work of the College, but also to aid the student in securing that training so necessary to enable one to appear before an audience, that training which every student needs and which cannot be secured in the class room alone. It is the purpose of the officers of the College to keep each Friday evening open that the work of these societies may go on without interruption. Every student is invited, even urged, to join one of these societies.

DEBATING LEAGUE.

The Debating League is an organization composed of the Bachelor, Beardshear, Crescent, Phileleutheroi, Philomathean, Pythian, Welch, and Forum literary societies. Its function is to arrange for and to carry out debates, both inter-society and inter-collegiate. There is an inter-society debate each semester, calling out four students from each society. Of these four students, two maintain the affirmative and two the negative of the same proposition on the same night against opposing teams from other societies. During the year the inter-society contests give opportunity for forty-eight students to engage in vigorous debate, and many others get practice in trying to win a place on their society teams. During the fall semester a dual debate is held with the Iowa State Normal School, thus calling out six debaters from each school. The triangular inter-collegiate debate with Drake University and Iowa College held during the spring semester also calls for six students to represent the Iowa State College. On the second Friday in April, 1910, the first dual debate will be with the University of South Dakota. All these debates arouse great interest in the College world, and, to the participants, they bring unmeasured profit.

ORATORICAL ASSOCIATION.

The Oratorical Association is composed of three members from each of the literary societies and three from the faculty. This association, by providing for joint public programs, declamatory and

oratorical contests, and society graduation, helps to increase the interest in the general literary work of the school.

Inter-society oratorical contests are held each fall semester and declamatory contests each spring semester, each society having one representative. The winner in the inter-society oratorical contest represents the College in the annual inter-collegiate contest in which Penn, Parsons, Upper Iowa University, Cornell, Des Moines, Coe, Lennox, Leander Clark, Tabor, Central University, Beuna Vista College, and Iowa State College are represented.

MUSICAL ORGANIZATIONS.

The College maintains a Choral Society (membership being open both to students and to citizens of Ames), a College Choir, a Glee Club, and a Ladies' Glee Club, all of which give frequent concerts and recitals. The musical organizations are under the supervision of the Director of Music.

A College Band of thirty-two pieces is maintained under the instruction of Charles L. Mundhenk, a member of the Iowa State Band of 1893. This band furnishes music in connection with the Military Department and also for all athletic and student assemblies.

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DIVISION OF AGRICULTURE 1911-1912

IOWA
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AGRICULTURE and
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DIVISION OF AGRICULTURE
MARCH, 1911
AMES, IOWA

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Calendar

1911

FIRST SEMESTER

August 30-31, Wednesday and Thursday, 8:00 A. M.	Entrance Examinations.
September 1, Friday, 8:00 A. M.	First Semester begins.
September 1-2, Friday, 8:00 A. M. to Saturday, 5:00 P. M.	Registration-Classification Days.
November 23-25, Thursday to Saturday	Thanksgiving Vacation.
December 19-20, Tuesday and Wednesday	Semester Examinations.
December 20, Wednesday, 5:00 P. M.	College Work closes.

1912.

January 1-13, Monday to Saturday	Special Short Courses in Agriculture and Domestic Economy.
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1912.

SECOND SEMESTER.

January 16-17, Tuesday and Wednesday	Entrance Examinations.
January 18-20, Thursday, 1:30 P. M., to Saturday, 5:00 P. M.	Registration-Classification Days.
March 27, Wednesday, 5:00 P. M.	Easter Vacation begins.
April 1, Monday, 7:00 P. M.	Easter Vacation closes.
June 2, Sunday, 10:30 A. M.	Baccalaureate Sermon.
June 2, Sunday, 8:00 P. M.	Address before the Christian Associations.
June 3, Monday, 2:30 P. M.	Graduation Exercises of Literary Societies.
June 3, Monday, 8:00 P. M.	Junior Class Play.
June 4, Tuesday, 2:30 P. M.	Senior Class Day Exercises.
June 4, Tuesday, 8:00 P. M.	Grand Concert.
June 5, Wednesday, 7:30 A. M.	Senior Breakfast.

June 5, Wednesday	Alumni Business Meeting.
June 6, Thursday, 10:30 A. M.	Commencement Address and Pre- sentation of Diplomas.
June 6, Thursday, 1:00 P. M.	Alumni and Faculty Banquet.
June 7, Friday.	Summer Vacation begins.

State Board of Education of Iowa

MEMBERS

HON. J. H. TREWIN, President.....	Cedar Rapids
HON. A. B. FUNK.....	Spirit Lake
HON. GEO. T. BAKER.....	Davenport
HON. T. D. FOSTER.....	Ottumwa
HON. ROGER LEAVITT.....	Cedar Falls
HON. D. D. MURPHY.....	Elkader
HON. CHAS. R. BRENTON.....	Dallas Center
HON. P. K. HOLBROOK.....	Onawa
HON. EDW. P. SCHOENTGEN.....	Council Bluffs

FINANCE COMMITTEE.

HON. W. R. BOYD, President.....	Cedar Rapids
HON. THOMAS LAMBERT.....	Sabula
HON. D. A. EMERY, Secretary.....	Ottumwa

Officers of Instruction

THE FACULTY.

- EDGAR WILLIAMS STANTON. *1877, 1874...Acting President, Dean of Junior College, Dean of Division of Science, Professor of Mathematics
B. Sc., Iowa State College, 1872; M. Sc., 1887; LL. D., Coe, 1904.
- CHARLES FRANKLIN CURTISS. 1897, 1891...Dean of the Division of Agriculture, Director of Experiment Station
B. S. A., Iowa State College, 1887; M. S. A., Iowa State College, 1892; D. Sc. in Agriculture, Michigan Agricultural College, 1907.
- ANSON MARSTON. 1892...Dean of Division of Engineering, Professor of Civil Engineering
B. C. E., Cornell University, 1889.
- CHARLE HENRY STANGE. 1909-1907...Dean of the Division of Veterinary Medicine, Professor of Theory and Practice and Sanitary Science
D. V. M., Iowa State College, 1907.
- HONORABLE JAMES WILSON. 1902, 1891...Lecturer in Agriculture
M. S. A., Iowa State College, 1907.
- GENERAL JAMES RUSH LINCOLN. 1884, 1883...Professor of Military Science
- ALFRED ALLEN BENNETT. 1885.....Professor of Chemistry
B. Sc., Michigan, 1877; M. Sc., Iowa State College, 1888.
- HERMAN KNAPP. 1887, 1883.....Registrar
B. S. A., Iowa State College, 1883.
- LOUIS HERMANN PAMMEL. 1889.....Professor of Botany
B. Agr., Wisconsin, 1885; M. S., 1889; Ph. D., Washington, St. Louis, 1898.
- LOUIS BEVIER SPINNEY. 1897, 1891.....Professor of Physics and Illuminating Engineering
B. M. E., Iowa State College, 1892; B. S. (E. E.), 1893.
- SAMUEL WALKER BEYER. 1898, 1891...Vice Dean of Division of Engineering, Professor of Geology and Mining Engineering
B. S., Iowa State College, 1889; Ph. D., Johns Hopkins, 1895.

* First date after the name indicates date of appointment to present position, the second date, when the first fails to do so, indicates the date of first appointment in the College.

- ALVIN BUELL NOBLE. 1898....Professor of Rhetoric and Literature
B. Ph., University of Iowa, 1887.
- HENRY ELIJAH SUMMERS. 1898.....Professor of Zoology
B. S., Cornell University, 1886.
- ORANGE HOWARD CESSNA. 1900.....Professor of History and
Psychology
B. S., Iowa State College, 1872; B. D., Garrett Biblical Institute,
1885; D. D., 1900; A. M., Cornell College, 1901.
- WILLARD JOHN KENNEDY. 1901..Professor of Animal Husbandry,
Vice Director of Experiment
Station
B. S. A., Iowa State College, 1899.
- WILLIAM HENRY STEVENSON. 1903, 1902.....Professor of
Agronomy
A. B., Illinois College, 1893; B. S. A., Iowa State College, 1905.
- SPENCER AMBROSE BEACH. 1905....Vice Dean of the Division of
Agriculture, Professor of Horticulture
B. S. A., Iowa State College, 1887; M. S., Iowa State College, 1892.
- PERRY GREELEY HOLDEN. 1906, 1902.....Superintendent of Agri-
cultural Extension Work.
B. S., Michigan Agricultural College, 1889; M. S. 1894; B. Pd.
Michigan Normal School, 1894.
- BENJAMIN HORACE HIBBARD. 1906, 1902..Professor of Economic
and Political Science
B. S. A., Iowa State College, 1898; Ph. D., Wisconsin, 1902.
- WARREN H. MEEKER. 1907, 1891.....Professor of Mechanical
Engineering
M. E., Cornell University, 1891.
- FRED ALAN FISH. 1907, 1905....Professor of Electrical Engineering
M. E. in E. E., Wisconsin, 1904.
- JAY BROWNLEE DAVIDSON. 1907, 1905..Professor of Agricultural
Engineering
B. S., M. E., Nebraska, 1904.
- ASHLEY VAN STORM. 1907.....Extension Professor of Public
School of Agriculture
Ph. B., Illinois Wesleyan, 1898.
- ARTHUR MACMURRY. 1908.....Professor of Public Speaking
A. B., Kansas, 1896; M. O., Ott School of Expression, Chicago, 1904.
- ROBERT EARLE BUCHANAN. 1909, 1904..Professor of Bacteriology
B. S., Iowa State College, 1904; M. S., Iowa State College, 1906;
Ph. D., Chicago, 1908.
- RALPH R. DYKSTRA. 1909, 1905..Professor of Anatomy and Obstetrics
D. V. M., Iowa State College, 1905.

- MARTIN MORTENSEN. 1909.....Professor of Dairying
B. S. A., Iowa State College, 1909.
- FLETCHER BRIGGS. 1909.....Professor of Modern Languages
Ph. B., Iowa, 1901; M. A., 1902.
- HAROLD DE MOTT HUGHES. 1910.....Professor of Farm Crops
B. S., University of Illinois, 1907; M. S. A., University of
Missouri, 1908.
- VIRGILIA PURMORT. 1910.....Professor of Home Economics
Coe College; Normal Course in Domestic Science, Iowa State
College; Teachers' Diploma in Domestic Science, Drexel Institute.
- MARIA M. ROBERTS. 1904, 1891.....Vice Dean of Junior College,
Associate Professor of Mathematics
B. L., Iowa State College, 1890.
- ARTHUR THOMAS ERWIN. 1904, 1900.....Associate Professor of
Horticulture
B. S., Arkansas, 1899; M. S. A., Iowa State College, 1902.
- LOLA ANNE PLACEWAY. 1905, 1896..Associate Professor of Chemistry
B. S., Iowa State College, 1895.
- VINA ELETHE CLARK. 1897.....Librarian
- JOHN PIPER WATSON. 1904.....Physical Director
- CHARLES BEECHER STANTON. 1907..Associate Professor of Rail-
way Engineering
C. E., Rensselaer Polytechnic Institute, 1903.
- IRA A. WILLIAMS. 1907, 1898.....Associate Professor of Geology
and Mining Engineering
B. S., Iowa State College, 1898; M. S., Iowa State College, 1903;
A. M., Columbia, 1904.
- JOHN EDWARD KIRKHAM. 1907..Associate Professor of Structural
Engineering
B. S., in C. E., Missouri, 1895.
- WINFRED FORREST COOVER. 1907, 1904....Associate Professor of
Chemistry
A. B., Otterbein University; A. M., Ohio State University.
- LAURENCE C. HODSON. 1907, 1906....Associate Professor of Mining
Engineering
B. C. E., 1898; E. M., Michigan College of Mines, 1901.
- ELIZABETH MACLEAN. 1908, 1899...Associate Professor of English
B. Di., State Normal, Iowa, 1894; M. Di., 1900; B. Ph., Chicago,
1909.
- MARK PERKINS CLEGHORN. 1908, 1902....Associate Professor of
Mechanical Engineering
B. S. in E. E., 1902, Iowa State College, M. E., 1907.

- ADOLPH SHANE. 1908, 1904.....Associate Professor of Electrical
Engineering
B. S. in E. E., Nebraska, 1901; E. E., Iowa State College, 1908.
- CHARLES CURTIS MAJOR. 1908..Associate Professor of Mechanical
Engineering
M. E., Blomsuburg Normal School, Pa., 1891; M. E., Cornell University, 1898.
- WILLIAM MILTON BARR. 1909..Associate Professor, Metallurgy in
Mining Engineering
B. S., Iowa, 1902; A. M., Grinnell, 1904; Ph. D., in Chemistry, Pennsylvania, 1908.
- WILLIAM WALLACE DIMOCK. 1909..Associate Professor, Veterinary
Medicine
B. Agr., Connecticut Agricultural College, 1901; D. V. M., Cornell University; D. V. M., University of Habana, 1907.
- EDWARD NORRIS WENTWORTH. 1909, 1907..Associate Professor
of Animal Husbandry
B. S. A., Iowa State College, 1907; M. S. A., Iowa State College, 1909.
- WILLIAM HARPER PEW. 1909.....Associate Professor of Animal
Husbandry
B. S. A., Iowa State College, 1907.
- CATHERINE J. MACKAY. 1910.....Associate Professor of Home
Economics.
Drexel Institute. Diploma in Domestic Science, Boston Cooking School, Teachers' College, Columbia University.
- CLARE NEWTON ARNETT. 1910.....Associate Professor of
Animal Husbandry
B. S., Purdue University, 1907.

ASSISTANT PROFESSORS.

- ALEXANDER STEWART THOMPSON. 1907..Director of Music, Piano,
Pipe Organ and Voice
Royal College, London; Guild Hall School of Music, London.
- CLARA DUTTON-THOMPSON. 1907...Vice-Director Voice, Prepara-
tory Piano and Organ
Cazenovia Seminary; Guild Hall School of Music.
- JOSEPH EDWARD GUTHRIE. 1904, 1902....Assistant Professor of
Zoology
B. S., Minnesota, 1900; M. S., 1901.
- THOMAS HARRIS McDONALD. 1905, 1904..Assistant Professor, Civil
Engineering in Charge of Good Road Investigations
B. C. E., Iowa State College, 1904.

- ERNEST ALANSON PATTENGILL. 1906, 1900..Assistant Professor
of Mathematics
B. S., Iowa State College, 1897; B. S., Cornell University, 1899.
- JULIA TRUEMAN COLPITTS. 1906, 1900.....Assistant Professor of
Mathematics
A. B., Mount Allison University, Canada, 1899; A. M., Cornell
University, 1900.
- LOUIS BERNARD SCHMIDT. 1906....Assistant Professor of History
Ph. B., Cornell College, 1901; A. M., 1906.
- ROY A. NORMAN. 1907..Assistant Professor of Mechanical Engineering
B. M. E., Iowa State College, 1903; M. E., Iowa State College, 1909.
- HOWARD CARLTON FORD. 1907..Assistant Professor, Surveying
and Irrigation
B. S. (C. E.), Colorado, 1904; M. S., 1905; C. E., 1907.
- ARTHUR HENRY HOFFMAN. 1907, 1905....Assistant Professor of
Physics
A. B., Iowa Wesleyan, 1897; A. M., 1905; B. S. in E. E., Iowa State
College, 1905.
- WILLIAM BALLENTYNE ANDERSON. 1907, 1905..Assistant Professor
of Physics
B. S., Wisconsin, 1901; M. S., 1903; Ph. D., 1906.
- ELIZABETH MOORE. 1908, 1904.....Assistant Professor of English
Ph. B., Iowa College, 1900; Ph. M., Chicago, 1902.
- SYBIL M. LENTNER 1908, 1904.....Assistant Professor of Public
Speaking
B. S., Iowa State College, 1900.
- WINIFRED RICHARDS TILDEN. 1908, 1904....Physical Directress
B. A., Mount Holyoke, 1904.
- DORA GILBERT TOMPKINS. 1908, 1905.....Assistant Professor of
English
A. B., Monmouth College, 1893; A. M., Knox College, 1898.
- JULIA RAMSEY VAULX. 1908, 1906..Assistant Professor of English
A. B., Arkansas, 1894; A. M., Cornell University, 1897.
- ROY HIRAM PORTER. 1908, 1906....Assistant Professor, Mechanical
Engineering
B. M. E., Maine, 1906.
- MORRISS IRWIN EVINGER. 1908, 1906.....Assistant Professor of
Civil Engineering
B. C. E., Iowa State College, 1906.
- JOHN EDWIN BRINDLEY. 1908, 1907.....Assistant Professor of
Economic Science
B. L., Wisconsin, 1902; A. M., 1906.

- HAROLD EDWARD BEMIS. 1908..Assistant Professor of Surgery and
Obstetrics
D. V. M., Iowa State College, 1908.
- C. E. BARTHOLOMEW. 1909, 1904..Assistant Professor of Entomology
B. S., Iowa State College, 1904; M. S.
- WILLIAM RANDOLPH RAYMOND. 1909, 1907..Assistant Professor
of English
A. B., Grinnell, 1894.
- EVERETT WALTER HAMILTON. 1909, 1907..Assistant Professor of
Agricultural Engineering
B. S. A., Iowa State College, 1907.
- ROY WINCHESTER CRUM. 1909, 1907..Assistant Professor of Civil
Engineering
B. C. E., Iowa State College, 1907.
- JOSEPH FREDERICK BARKER. 1909, 1908..Assistant Professor of
Soils
B. S. A., Ohio, 1908; M. S. A., Iowa State College, 1910.
- *HARRY WOY GRAY. 1909..Assistant Professor of Civil Engineering
B. C. E., Iowa State College, 1906.
- HOWARD SYLVESTER MURPHEY. 1909....Assistant Professor of
Veterinary Medicine
D. V. M., Ohio, 1908.
- ROY EVERETT ROUDEBUSH. 1909..Assistant Professor of Mechan-
ical Engineering
A. B., Indiana, 1903; M. E. Cornell University, 1907.
- JOHN HAROLD GORDON. 1909.....Assistant Professor of Dairy
Bacteriology
B. S. in Agr., Missouri, 1909.
- JESSE GREENLEAF HUMMEL. 1910, 1903....Assistant Professor of
Mechanical Engineering
B. M. E. Iowa State College, 1902.
- JOHN THAXTER BATES. 1910, 1907.....Assistant Professor of
Mechanical Engineering
B. M. E., University of Maine, 1907.
- HENRY HERBERT KILDEE. 1910....Assistant Professor of Animal
Husbandry, in Charge of Dairy Farm
B. S. A., Iowa State College, 1908.
- HARRY BLAINE POTTER. 1910..Assistant Professor of Farm Crops
B. S., Purdue University, 1909.
- GILMOUR BEYERS MACDONALD. 1910..Assistant Professor of
Forestry
B. S. F., University of Nebraska, 1907.

* Leave of absence from January 1, 1911.

PERCY EDGAR BROWN. 1910.....Assistant Professor of Soil
Bacteriology

B. S. Rutgers, 1906; A. M., Rutgers, 1909.

WALTER HENRY COOPER. 1910....Assistant Professor of Dairying
B. S. A., University of Wisconsin, 1907; M. S., University of Wisconsin, 1909.

GRACE ELFLEDA RUSSELL. 1910..Assistant Professor of Domestic
Art

B. S., Teachers' College, Columbia University, 1908.

MARK G. THORNBURG. 1910.....Assistant Professor of Animal
Husbandry

B. S. A., Iowa State College, 1910.

INSTRUCTORS

EZRA CORNELIUS POTTER.....Instructor in Pattern Shop, 1898
ANNIE WILSON FLEMING, B. S.....Instructor in Mathematics, 1900
GRACE ISABEL NORTON, B. A.... ..Instructor in German, 1901
WARD MURRAY JONES, B. C. E.....Instructor in Mathematics, 1902
EDWARD MERRITT SPANGLER.....Instructor in Pattern Shop,
1905, 1904

LOLA STEPHENS, B. S.....Instructor in Chemistry, 1906, 1905
LAURA MAY TAGGART, B. S.....Instructor in Chemistry, 1907, 1906
INGEBORG G. LOMMEN, M. L.....Instructor in German, 1907
WILLIAM KUNERTH, A. B.....Instructor in Physics, 1907
HELEN FLORENCE SMITH, A. B....Instructor in Mathematics, 1907
FREDERICKA VON TRICE SHATTUCK, B. A..Instructor in Public
Speaking, 1907

JOSEPH B. VARELA.....Instructor in Mechanical Drawing, 1907
JAMES WILLIAM CAMERON...Instructor in Forge Work, 1908, 1907
JOHN A. SAWIN.....Instructor in Foundry, 1908, 1907
AGNES GINA MOSHER, M. S.....Instructor in Mathematics, 1908
CARRIE C. WATTERS, B. A.....Instructor in History, 1908
MRS. MARY PETERS FAIRFIELD, B. A...Instructor in French, 1908
MRS. MARGARET ALISON ARVILLE, A. B....Instructor in Spanish
and French, 1908

RUTH BOGARDUS SAFFORD, B. L.....Instructor in English, 1908
HENRY NESS, B. S. A.....Instructor in Zoology, 1909, 1906
DANIEL WILLIS SYLVESTER..Instructor in Agricultural Engineer-
ing, 1909, 1908

CHARLES OSMOND ALEXANDER, B. M. E...Instructor in Agricul-
tural Engineering, 1909, 1908

CHARLES MURRAY, B. Pe.....Instructor in Bacteriology, 1909, 1908

WILLIAM A. LIPPINCOTT, A. B.....Instructor in Poultry, 1908

CLIFFORD VERNE GREGORY....Instructor in Agricultural Journal-
ism, 1908

ROY EUGENE SMITH, B. S. A.....	Instructor in Soils, 1909
VIVIAN DANGERFIELD BEARD, B. C. E.....	Instructor in Civil Engineering, 1909
CHARLES ALTON BAUGHMAN..	Instructor in Civil Engineering, 1909
HERBERT JOHN PLAGGE, B. S..	Instructor in Physics and Illuminating Engineering, 1909
ESTHER LEIPER COOPER, Ph. B.....	Instructor in English, 1909
WILLIAM ALFRED BEVAN, B. S.....	Instructor in Physics, 1909
INGEBORG SVENDSEN TUNE.....	Instructor in Music, 1909
JOHN HUG, B. M. E.....	Instructor in Machine Shop, 1909
CHESTER CHARLES FOWLER, B. S....	Instructor in Chemistry, 1909
NELLIE NAYLOR, B. A.....	Instructor in Chemistry, 1909
JESSIE MILDRED MACLEAN, A. B., A. M..	Instructor in English, 1910
HARRY JOHN EVANS, B. S. A.....	Instructor in Dairying, 1910
ARTHUR LAWRENCE BAKKE, B. S.....	Instructor in Botany, 1909
ADA HAYDEN, B. S., M. S.....	Instructor in Botany, 1910
JAMES CLOYD BOWMAN, B. Litt.....	Instructor in English, 1910
MAY CHASE, B. S.....	Instructor in Mathematics, 1910
BRUCE MAGILL HARRISON, B. S., M. S..	Instructor in Zoology, 1910
EDWARD ALBERT EBERHARDT, A. M...	Instructor in German, 1910
GRACE MEDORA VIALI, Ed. B., Ph. B.....	Instructor in Home Economics, 1910
HARRIET EDITH SESSIONS, B. S.....	Reference Librarian, 1910
EDWARD HENRY DUSHAM, B. A.....	Instructor in Zoology, 1910
MARY TERESA MUELLER, Ph. B., M. A..	Instructor in English, 1910
THOMAS MONTGOMERY McCALL, B. S. H....	Instructor in Horticulture, 1910
BURLEIGH BUREN REED, B. S.....	Instructor in Chemistry, 1910
HARRY VINCENT CALDWELL, B. S. A.....	Instructor in Soils, 1910
JOHN ROY CAMPBELL, B. S. A.....	Instructor in Botany, 1910
PAUL W. CROWLEY, B. S. A.....	Instructor in Dairying, 1910
FRANK WISDOM ALLEN, JR., B. S. A.....	Instructor in Horticulture, 1910
FRANK ANSON ROBBINS, B. S., A. B.....	Instructor in Electrical Engineering, 1910
ROBERT LYLE SPENCER....	Instructor in Mechanical Engineering, Drawing, 1910
CASSANDRA WALLACE.....	Instructor in Violin, 1910
STACEY TURNEY.....	Instructor in Chemistry, 1910
HARRY CLARENCE BIDDLE, A. B.....	Instructor in Chemistry, 1910
OTTO MITCHELL SMITH, B. S....	Instructor in Mining Engineering, 1910
STANLEY B. FRACKER, A. B.....	Instructor in Zoology, 1911
WILLIAM ROY HECKLER, B. S. A....	Instructor in Farm Crops, 1911
ALOIS F. NICKELS.....	Instructor in Mechanical Engineering, 1911
HAZEL KYRK, B. A.....	Instructor in Economic Science, 1911

RESIDENT LECTURER

GEORGE JUDISCH.....Lecturer in Pharmacy, 1901

NON-RESIDENT LECTURER

OLE JOHN HENDERSON, B. S., B. L. L...Lecturer in Rural Law, 1909

ASSISTANTS

HARRIETTE KELLOGG, A. M.....Curator of the Herbarium, 1903

GEORGE MITCHELL.....Farm Superintendent, 1906

*MARGARET FORGEUS, A. B.....Library Cataloguer, 1906

CHARLES L. MUNDHENK.....Brass Instruments, 1906

CAROLINE E. LAIRD...Assistant Librarian, Engineering Library, 1907

VERA MORLAN DIXON, B. S...Assistant Librarian, General Library;
1908

ROBINA MARGUERITE RAE.....Assistant Librarian, Agricultural
Library, 1909

MELLIE MORRIS SMITH.....Cataloguer, Library, 1909

JOHN REARDON.....Gardener, 1909

BRUCE A. COLE...Mechanician, Civil and Electrical Engineering, 1909

KATHERINE ROGERS.....Assistant Cataloguer in Library, 1911

HENRY DALE BERGMAN, D. V. M..Assistant in Veterinary Medicine,
1910

MILDRED BURRITT JONES, B. A.....Assistant in History, 1910

STUDENT ASSISTANTS

CHESTER R. SHUMWAY.....Student Assistant in Zoology, 1908

ETHEL McDONALD.....Student Assistant in Home Economics, 1909

ROY TRUAX.....Student Assistant in Bacteriology, 1909

MAUD ARNOLD.....Student Assistant in Mathematics, 1910

MARGARET WENTCH.....Student Assistant in Mathematics, 1910

JOHN FERDINAND FERM..Student Assistant in Mechanical Engineer-
ing, 1910

HENRY EICHLING.....Student Assistant in Farm Crops, 1910

* Resigned Jan. 1, 1911.

Agricultural Experiment Station Staff

EDGAR WILLIAMS STANTON, M. S., LL. D.....	Acting President
CHARLES FRANKLIN CURTISS, M. S. A., D. S.....	Director
WILLARD JOHN KENNEDY, B. S. A.....	Vice Director and Animal Husbandry
LOUIS HERMANN PAMMEL, B. Ag., M. S., Ph. D.....	Botanist
HENRY ELIJAH SUMMERS, B. S.....	Entomologist
WILLIAM HENRY STEVENSON, A. B., B. S. A.....	Soils
SPENCER AMBROSE BEACH, B. S. A., M. S.....	Horticulturist
JAY BROWNLEE DAVIDSON, B. S., M. S. A..	Agricultural Engineering
CHARLES HENRY STANGE, D. V. M.....	Veterinary
ROBERT EARLE BUCHANAN, M. S.....	Bacteriologist
VINA ELETHE CLARK.....	Station Librarian
MARTIN MORTENSEN, B. S. A.....	Dairying
WILLIAM WALLACE DIMOCK, D. V. M.....	Veterinary
ARTHUR WAYLAND DOX, B. S., A. M., Ph. D.....	Chemist
HAROLD DE MOTT HUGHES, M. S.....	Farm Crops
GILMOUR BEYERS MACDONALD, B. S. F.....	Forester
CHARLOTTE MARIA KING.....	Assistant in Botany
HARRIETTE KELLOGG, A. M.....	Assistant in Botany
MATTHEW LEANDER KING, B. M. E..	Experimentalist in Agricultural Engineering
FRED ERVING COLBURN.....	Photographer
LYMAN CRANE BURNETT, M. S. A.....	Assistant in Farm Crops
ROBERT LORENZO WEBSTER, A. B.....	Assistant in Entomology
LAURENZ GREENE, B. S. A., M. S. A..	Experimentalist in Horticulture
JOHN HAROLD GORDON, B. S. in Ag.....	Dairy Bacteriologist
HENRY HERBERT KILDEE, B. S. A....	Experimentalist in Animal Husbandry
SAMUEL L. JODIDI, B. S., Ph. D.....	Experimentalist in Soils
STELLA AGNES HARTZELL, B. Sc., A. M.....	Assistant Chemist
SEYMOUR C. GUERNSEY, B. S. A.....	Assistant Chemist
ALFRED A. WELLS, B. S.....	Assistant in Soils
LEE W. FORMAN, B. S. A.....	Field Superintendent in Soils
ROBINA M. RAE.....	Assistant in Station Library
CLIFFORD VERNE GREGORY.....	Editor, Station Bulletins
WILLIAM ADAMS LIPPINCOTT.....	Assistant in Poultry
PERCY EDGAR BROWN, B. S., A. M.....	Experimentalist in Soil Bacteriology
JOHN MARCUS EVVARD, M. S..	Experimentalist in Animal Husbandry
ROY E. NEIDIG.....	Assistant in Chemistry

Agricultural Extension

EDGAR WILLIAMS STANTON, M. S., LL. D.....Acting President,
Ex-Officio
CHARLES FRANKLIN CURTISS, M. S. A.....Dean of Agriculture,
Ex-Officio

AGRICULTURAL EXTENSION STAFF

PERRY GREELEY HOLDEN, M. S., B. Pd.....Superintendent
ASHLEY VAN STORM, Ph. B.....Schools
E. C. BISHOP.....Schools
RALPH K. BLISS, B. S. A.....Animal Husbandry
ADDISON H. SNYDER, B. S.....Soils
NEALE S. KNOWLES.....Home Economics
GEORGE RAYMOND BLISS, B. S. A.....Horticulture
HAROLD FREDERICK LUICK, B. S. A.....Dairying
E. Y. CABLE.....Assistant in Agricultural Engineering
MARTIN LUTHER MOSHER, B. S. A.....Lecturer, Farm Crops
MURL McDONALD.....Assistant, Farm Crops
GERTRUDE N. ROWAN, B. A., A. M...Assistant in Home Economics
ARTHUR A. BURGER.....Animal Husbandry

Organization and History

The laws of the State of Iowa provide for the management and control of the State College of Agriculture and Mechanic Arts by the State Board of Education. This board consists of nine men nominated by the Governor and confirmed by the Senate. This Board appoints a Finance Committee consisting of three men who give their entire time to the management and control of the three state institutions of Iowa, under such rules and regulations as the State Board of Education may prescribe.

THE SCOPE

The Iowa State College of Agriculture and Mechanic Arts seeks to aid the young men and women in the acquirement of a higher education. Instruction is given in the culture studies and sciences, together with such experimental work as to enable the students successfully to engage in a practical profession. Throughout the several courses, the study of the textbook is supplemented by lectures, discussions, library work, and the practical experimental work of the laboratory. The instruction is not merely theoretical, but also practical, the student verifying and putting into practice in the laboratory the instruction received.

The Iowa State College offers four five year courses and fourteen four year courses leading to the following degrees:

FIVE YEAR COURSES

Five year course in Mechanical Engineering, leading to the degree of Bachelor of Science in Mechanical Engineering, B. S. in M. E.

Five year course in Civil Engineering, leading to the degree of Bachelor of Science in Civil Engineering, B. S. in C. E.

Five year course in Electrical Engineering, leading to the degree of Bachelor of Science in Electrical Engineering; B. S. in E. E.

Five year course in Mining Engineering, leading to the degree of Bachelor of Science in Mining Engineering, B. S. in E. M.

FOUR YEAR COURSES

Courses in Agronomy, leading to the degree of Bachelor of Science in Agronomy, B. S. in Agn.

Course in Dairying, leading to the degree of Bachelor of Science in Dairying, B. S. in Dairying.

Course in Animal Husbandry, leading to the degree of Bachelor of Science in Animal Husbandry, B. S. in A. H.

Course in Horticulture and Forestry, leading to the degree of Bachelor of Science in Horticulture and Forestry, B. S. in Hort. and For.

Course in Agricultural Engineering, leading to the degree of Bachelor of Science in Agricultural Engineering, B. S. in A. E.

Course in Science and Agriculture, leading to the degree of Bachelor of Science in Science and Agriculture, B. S. in Sci. and Agr.

Course in Veterinary Medicine, leading to the degree of Doctor of Veterinary Medicine, D. V. M.

Course in Mechanical Engineering, leading to the degree of Bachelor of Science in Mechanical Engineering, B. S. in M. E.

Course in Civil Engineering, leading to the degree of Bachelor of Science in Civil Engineering, B. S. in C. E.

Course in Electrical Engineering, leading to the degree of Bachelor of Science in Electrical Engineering, B. S. in E. E.

Course in Mining Engineering, leading to the degree of Bachelor of Science in Mining Engineering, B. S. in E. M.

Course in Ceramics, leading to the degree of Bachelor of Science in Ceramics, B. S. in Cer.

Course in General Science, leading to the degree of Bachelor of Science, B. S.

Course in Home Economics, leading to the degree of Bachelor of Science in Home Economics, B. S. in H. E.

Two year courses are also offered in Clay Working and Agriculture, and one year courses in Poultry Husbandry and Dairying, for the completion of which, certificates will be given. That many, who are unable to take the full college course, may take advantage of the advancement being made in their chosen work, a two weeks' short course is now offered each year during the winter vacation in Stock and Grain Judging and Dairying. A School of Good Road Investigations is also held during each summer vacation. The interest in all of these short courses is becoming greater, the attendance is increasing, and the benefits to be derived from them are constantly increasing.

LOCATION

The College occupies a delightful and healthful location upon high, rolling land in the west part of Ames, Story County. Situated at the junction of the north and south branch and the main double-track line of the Chicago & Northwestern Railroad, and connected with all the trunk lines of Iowa, Ames is easily accessible from all parts of the State. An electric railway connects Ames and the College with efficient service. The Fort Dodge, Des Moines and Southern Railway (electric), with stations on the campus, gives efficient service to the College, and excellent connections with the following trunk lines in Iowa: At Fort Dodge, with the Illinois Central and Chicago Great Western; at Kelley, with the Newton & Northwestern; at Huxley, with the Chicago, Milwaukee & St. Paul; at Des Moines, with the Chicago, Rock Island & Pacific, the Chicago Great Western, and the Chicago, Burlington & Quincy.

Ames is a most desirable town for wholesome college influences. Its people are thrifty, enterprising and cordial. The town has an ex-

cellent system of public schools, numerous churches, waterworks, and electric lights, and it also has a good city government. It is an inviting community for families who wish to educate their children and to enjoy a good environment at a reasonable expense. Ames and the College are on very cordial terms, and its citizens seek to promote the efforts of the students and the highest interests of the College.

THE COLLEGE GROUNDS

Of the entire College domain of 1,200 acres, 125 acres are set apart for College grounds. These include the experimental plots, the young forestry plantations, the surroundings of the professors' dwellings, and the central campus with its beautiful winding walks and drives; its trees, shrubbery, and flower gardens; and its large and stately college buildings. The true principles of landscape gardening have been so faithfully observed in the gardening and in the location of buildings and drives as to make the entire campus a large and beautiful park.

BUILDINGS

Thirty-six commodious buildings have been erected by the State for the exclusive use of the various departments of the College, besides the dwelling houses and the buildings for farm stock, machinery, and work. All of these buildings are heated by steam, lighted by electricity, and supplied with pure water.

ACCREDITED SCHOOLS

High schools and academies are placed on the accredited list upon the recommendation of the Board on Secondary School Relations, and the approval of the Faculties of the three State Educational Institutions of Iowa. The Board on Secondary School Relations was appointed by the Iowa State Board of Education and consists of the following members:

Forest C. Ensign, Inspector of Secondary Schools, Iowa City.

Herbert C. Dorcas, Registrar, State University, Iowa City.

Herman Knapp, Registrar, State College, Ames.

Charles S. Cory, Registrar, State Teachers College, Cedar Falls.

All questions with regard to the inspection or relation of the schools to the three state institutions should be addressed to Forest C. Ensign, Inspector of Secondary Schools for the State Board of Education.

Admission to the College

All communications with regard to the admission of any student to the College should be addressed to the Registrar. The Registrar will determine the value of all credentials and will notify the applicant of their acceptance. He will also assign the applicant for admission to his position in the course desired. This assignment will be conditioned upon the student's doing creditable work.

Applicants for admission to the freshman class should be at least sixteen years of age.

A student may enter the College at the beginning of either semester. The regular classes begin with the opening in September and the student is urged to commence at that time. The freshman subjects are, however, taught in both semesters. The Freshman work will be of such grade that a graduate of an accredited school can reasonably be expected to be prepared to carry it creditably. The responsibility of maintaining himself in the Freshman class rests, however, upon the student. The College desires to emphasize the importance of thorough preparation, particularly in subjects that are to be continued in College, as for example, Mathematics and English. In these subjects the College has found it helpful to conduct a review for the first two or three weeks of the freshman year. At the end of this review students are assigned to sections covering the work which they are fitted to undertake. As without thorough preparation satisfactory progress in advance work is impossible, students are urged to review carefully before entering the College algebra through quadratics, English composition, and grammar. Students desiring admission should examine **THE REQUIREMENTS FOR ADMISSION AND THE METHODS OF OBTAINING THE FIFTEEN UNITS FOR ADMISSION.**

REQUIREMENTS FOR ADMISSION TO THE SEVERAL DIVISIONS OF THE COLLEGE

(Requirements for Short Course Students, see Index).

The requirements for admission are stated in terms of units. An entrance unit is defined as thirty-six weeks of high school work in one subject of study, with five class periods per week each not less than forty minutes in length. Each laboratory period should be at least 80 minutes in length. Students desiring admission to the Freshman year must present fifteen units. Of these, certain are required and the balance may be elective.

UNITS REQUIRED FOR ADMISSION

	Division of Agriculture. Units.	Division of Veterinary. Units.	Division of Engineering. Units.	Division of Science. Units.
Algebra	1½	1½	1½	1½
Geometry, Plane	1	1	1	1
Geometry, Solid			½	
English	3	3	3	3
<p>Not less than 3 semesters in literature; and 3 semesters in composition and rhetoric, and grammar, provided that no credit will be given for grammar if taken in the ninth grade.</p>				
History	1	1	1	1
<p>May include civics and economics. United States History is not to be accepted unless taken within the latter half of the secondary school course. Not more than one-half unit of the required units is to be allowed for civics.</p>				
Foreign Language	2	2	2	2
Electives—				
From the following list of electives	6½	6½	6	6½
	—	—	—	—
Total units for admission	15	15	15	15

Students may be admitted without Foreign Language under the following conditions:

The students must offer all the required units except the 2 in Foreign Language, together with sufficient elective units to make a total of 15.

A student may be admitted who is conditioned 1½ units, but the entrance conditions must be removed within one calendar year after his admission, or before he registers for his second year's work; and he is to be registered **at once** for the work in which he is deficient, **as a part** of the normal amount of work allowed to students.

In case a student presents 13½ to 15 acceptable entrance units, not including any foreign language, he must be conditioned to the extent of two units in foreign language; for such a student cannot make up the full amount of preparatory foreign language in one year. He should be permitted to complete the deficiency during the first half of his sophomore year. This will ordinarily require, if taken in College, extra work to the extent of five hours a week for three semesters. Such extra work will not be credited as a part of the credit hours required for graduation in the several courses.

Students admitted with conditions are not to be permitted to remove

these conditions within the allotted one year by taking entrance examinations in subjects in which they have been taking college courses for credit.

Students offering Foreign Language for admission units are urged to offer two units in one language, preferably a Modern Language.

In the divisions of Science and Engineering, no Foreign Language course of less than two units will be accepted for required entrance units in language.

In the divisions of Agriculture and Veterinary Medicine it is not necessary that the required units in Foreign Language be in one language.

List of Elective Units

The following is a list of elective subjects for which entrance credit may be allowed as indicated:

1. Foreign language (not more than a total of 4 units in any one foreign language, including the required 2 units).

- | | |
|-------------|--------------|
| (1) Greek | 2 to 4 units |
| (2) Latin | 2 to 4 units |
| (3) French | 2 to 4 units |
| (4) Spanish | 2 to 4 units |
| (5) German | 2 to 4 units |

2. English (additional to the required 3 units).

- (1) Not more than 1 unit; or a total of not more than 4 units, including the required 3 units.

3. History, civics and economics (not more than a total of 4 units in this group, including the required unit, and not more than the maximum credit here indicated in each case).

- | | |
|--|-------------------------|
| (1) Ancient history | $\frac{1}{2}$ to 1 unit |
| (2) Mediaeval and modern history | $\frac{1}{2}$ to 1 unit |
| (3) English history | $\frac{1}{2}$ to 1 unit |
| (4) U. S. history (only if taken within the latter half of the high school course) | $\frac{1}{2}$ to 1 unit |
| (5) General history (but not in addition to ancient, mediaeval and modern history) | 1 unit |
| (6) Civil government | $\frac{1}{2}$ to 1 unit |
| (7) Political economy | $\frac{1}{2}$ unit |

4. Mathematics:

- | | |
|------------------------|--------------------|
| (1) Solid geometry | $\frac{1}{2}$ unit |
| (2) Plane trigonometry | $\frac{1}{2}$ unit |
| (3) Advanced algebra | $\frac{1}{2}$ unit |

5. Science (not more than a total of $4\frac{1}{2}$ units in this group).

- | | |
|--|-------------------------|
| (1) Physics, not less than | 1 unit |
| (2) Chemistry, not less than | 1 unit |
| (3) Physical geography or physiography | $\frac{1}{2}$ to 1 unit |
| (4) Botany | $\frac{1}{2}$ to 1 unit |
| (5) Zoology | $\frac{1}{2}$ to 1 unit |

- | | |
|-----------------|-------------|
| (6) Physiology | ½ unit |
| (7) Geology | ½ unit |
| (8) Astronomy | ½ unit |
| (9) Agriculture | ½ to 1 unit |

6. Commercial subjects (not more than a total of 2 units in this group):

- | | |
|---|-------------|
| (1) Advanced arithmetic (only if taken after the completion of the required 1½ units in algebra or in the latter half of the high course) | ½ unit |
| (2) Double entry bookkeeping | ½ to 1 unit |
| (3) Commercial geography | ½ unit |
| (4) Commercial law | ½ unit |
| (5) Industrial history | ½ unit |

7. Industrial subjects (consisting in subjects in which there should be required for ½ entrance unit either 36 weeks of daily class exercises, each class exercise being not less than 40 minutes in length; or, still better, 18 weeks of daily class exercises, each class exercise being not less than 80 minutes in length):

- | | |
|--------------------------------------|--------------|
| (1) Freehand or mechanical drawing | ½ to 1 unit |
| (2) Manual training, i. e. shop work | ½ to 2 units |
| (3) Domestic science | ½ to 1 unit |
| (4) Stenography | ½ to 1 unit |

(Not more than a total of 2 units in this group.)

Note: Credit is not given, except upon the passing of the regular entrance examinations, for English grammar, and United States history, when these subjects are given in the 9th grade; nor for arithmetic when this subject is given before the *completion* of the required 3 semesters of work in algebra, or in the latter half of the course.

METHODS FOR OBTAINING THE FIFTEEN UNITS FOR ADMISSION

There are four methods of obtaining the necessary units for admission to the Freshman class:

- A. Admission by transfer from other Colleges and Universities.
- B. Admission by certificate from a fully accredited High School.
- C. Admission by Examination.
- D. Admission on other evidences of Proficiency.

A. Admission by Transfer From Other Colleges and Universities

A student who has entered another College or University of recognized standing and asks admission to this College, must present a certificate of honorable dismissal from the institution from which he comes. He must also present an official statement of the subjects upon which he was admitted to such institution. Provided it appears that the institution



A Class in Corn Judging

has Entrance Requirements equal with this College and that the certificate shows clearly that the student has been required to meet fully the thirty credits required by this College, he will then be admitted. For the acceptance of standings from other Colleges or Universities to apply as college work in this College, see Acceptance of Advanced Standings.

College Entrance Examinations

Certificates of entrance examinations passed for admission to reputable universities and colleges; and certificates of examination passed under the direction of any of the College Entrance Examination Boards and the Regents of the State of New York; may be accepted as certificates from our own accredited schools are accepted.

Academies and Preparatory Schools

Credits certified from private secondary schools such as academies, seminaries, etc.; and from college preparatory schools, shall be estimated in accordance with the definitions of the entrance unit and on the standard of four years of preparation and residence. College academies or preparatory departments conforming in their organization with the organization of the four-year accredited high school shall be treated as accredited schools, if the colleges themselves are regarded as standard colleges.

B. Admission by Certificate From the Fully Accredited High Schools

Graduates of the fully accredited High Schools of Iowa who meet fully the requirements for admission to the Freshman class, will, upon presentation of the proper Uniform Certificate, be admitted to the College without examination.

Graduates of schools fully accredited by the Colleges of other states which have as high a standard of entrance requirements as this institution, will also be admitted as Freshman upon presentation of certificate of graduation, accompanied by Uniform Admission Certificate.

Superintendents and Principals are urged to send to the Registrar immediately upon the close of the school year, the Uniform Admission Certificate of each graduate intending to enter the College at the beginning of the ensuing College year. If, on inspection, the certificate is found satisfactory, the applicant will be forwarded a certificate entitling him to admission without examination. Uniform Admission Certificates may be obtained by teachers and students upon application. Candidates for admission may apply to the Registrar for the Uniform blank. The Certificate must show the grade of work done and text-books used in the subjects required for entrance, with a definite statement of the year of the High School in which the subject was taken, the number of recitations per week, and the number of weeks the subject was pursued during the High School Course; and it must state that the applicant is of good moral

character and, in the judgment of the subscriber, able to pursue college studies successfully.

If, however, applicants from accredited four-year secondary schools present the superintendent's or principal's certificate showing deficiencies not exceeding $1\frac{1}{2}$ entrance units, together with that officer's statement that they are in good standing in the school from which they come, and that in the subscriber's judgment they are able to pursue college studies successfully, they may be admitted on **condition** that they make up enough credits to bring the number up to fifteen units within one year after their admission.

Diplomas of graduation will not be accepted for entrance unless accompanied by a Uniform Certificate as stated above.

All Uniform Certificates should be filed with the Registrar not later than the second Monday in August or the first Monday in January.

C. Admission by Examination (a suggestive list of examination questions may be obtained from the Registrar.)

Students desiring to enter by examination will be given such examinations in any subject required for entrance, upon presentation of satisfactory evidence of their having devoted sufficient time to the preparation of such subjects.

Students desiring to enter by examination will be expected to pass examinations in the required and elective subjects, according to work outlined on pages 35, 36 and 37.

The subject matter to be covered is according to the material found under the general statement concerning entrance units, page 41, which gives a synopsis of the amount and kind of work required for entrance.

D. Admission on other evidences of Proficiency

Admission from a Non-Accredited School

A student presenting a certificate from an **unaccredited** school may be admitted to collegiate courses by the following plan:

(1) He is to pass entrance examinations in acceptable subjects representing each of the main groups of subjects certified, for half of the number of acceptable credits so certified.

(2) The subjects for examination are to be selected by the college examiner at the time of the examination and irrespective of the choice of the student.

(3) The total number of credits ultimately allowed on the certificate shall not exceed twice the number earned by examination.

(4) The total amount of credit gained in this way, together with **additional** credit for subjects not indicated in the certificate (or subjects so indicated, but not acceptable), if additional credit is needed, shall be at least $13\frac{1}{2}$ units. In case he presents less than fifteen acceptable entrance units he is to be conditioned to the extent of enough units to bring the total number up to fifteen units.

Entrance Examination Periods

Examinations for entrance to College will be conducted at the opening of each semester on the Tuesday and Wednesday preceding classification.

Tuesday.

- 8 to 10 A. M.—Public Speaking. Room 308, Central Building.
- 10 to 12 A. M.—English. Rooms 1 and 3, Central Building.
- 1 to 3 P. M.—Language. Room 119, Central Building.
- 3 to 5 P. M.—Botany. Room 312, Central Building.

Wednesday.

- 8 to 10 A. M.—Mathematics. Room 221, Central Building.
- 8 to 10 A. M.—Chemistry. Chemical Hall.

SPECIAL STUDENTS

Students taking special work in any of the College courses must be at least twenty-one years of age, must give good and satisfactory reasons for desiring such classification, and must furnish satisfactory evidence that they are thoroughly prepared to pursue the work chosen. Permission to take such special course and the subjects included therein depends upon the approval of the President of the College and the Dean or Head of the Department in which the student seeks enrollment.

(1) Permission to take a special course will not be granted to students until they have completed the Freshman year of some one of the courses offered, and then only for a period not to exceed two years except on the recommendation of the Faculty of the division in which the student is enrolled and on approval of the President of the College.

(2) All special students shall pay additional fees for special work of ten dollars for each semester.

Special students are subject to the same rules governing conditions on back work as apply to all other students. A student wishing to change from a regular to a special or irregular course, either in the same or another department, will not be permitted to change from one course to another if he has a condition or a not pass in a subject not common to the two courses; or if he has more than one condition or not pass in subjects common to the two courses. Special students, as well as regular students, are subject to the conditions given under Requirements for Admission.

It is the theory of special classification that students should be particularly strong and well prepared to do thorough work in the studies they elect. A high standard of scholarship will, therefore, be required of all who are thus classified.

IRREGULAR COLLEGE STUDENTS

Worthy students of good standing, over twenty-one years of age, not prepared to meet the entrance requirements of the Freshman year may be

admitted without examination as irregular college students in the Engineering and the Science Divisions and the Department of Home Economics in the Agricultural Division, not to exceed two years, provided they give evidence of satisfactory preparation to carry such work successfully. Students will be required, however, to present a certificate covering their preliminary education. Irregular students who have not had previous work of collegiate grade will be required to take the first year of their work from Junior College studies. They will be confined in their choice of studies to one division of the College, and shall be subject in selecting such studies to the regulations governing regular college students in that division. During the second year they may be admitted to the Senior College studies in accordance with the rules governing admission to each study or course. These irregular college students will be registered, classified and dealt with, the same, as a regular college student who has entered college with $13\frac{1}{2}$ units.

FEES AND EXPENSES

The entire expenses of a student need not exceed \$300.00 per College year.

Tuition.—No charge for tuition is made to the students from the state of Iowa. To the non-residents, a tuition fee of \$25.00 per semester is charged.

Incidental Fee.—The regular incidental fee for the semester is \$12.00, but all students who classify during the classification period, Thursday, Friday, and Saturday, before College work begins, will be charged only \$10.00 per semester.

Laboratory Fees.—Laboratory fees at the actual cost of breakage and usage are charged to the students, the Treasurer's receipt for such fee being required before the students are admitted to laboratories. For the amount of the fee in any course the student should refer to the description of courses, under the department in which the course is taught (see index).

Special Student's Fee.—All special students shall pay an additional fee for special work of ten dollars per semester (see rule under Special Students).

Board and Room.—About one hundred young women can secure rooms in Margaret Hall. Students rooming in this building will be furnished with bed, mattress, rug, chairs, dresser and table. Students will furnish bedding and such other articles as they need.

The price for rent, heat and light will be from \$8.00 to \$14.00 per month according to the size and quality of the room. The room rent will be four months for the fall semester and five months for the spring semester, each payable in advance at the Treasurer's Office. In case of failure to take the room after making the deposit, the student will forfeit \$10.00.

In case one student wishes to occupy a room, she must pay the full



The Soils Laboratory

rent. Two persons will divide the rent. The Superintendent of Buildings reserves the right to assign two persons to each room if necessary.

All other students can secure furnished rooms and board in clubs or private families adjacent to the College grounds at from \$3.50 to \$5.00 per week.

The Superintendent of Buildings, should be consulted by all new students, concerning rooms and rooming places, that undesirable rooms and houses may be avoided. For sanitary or other reasons the College authorities reserve the right to forbid students from rooming in any particular house.

No group of young women students may establish a "house" or "home" without the full knowledge and approval of the President and the Dean of Women, nor make any definite plans in such direction. No young woman may become a resident of a sorority house until after she is an initiated member of the sorority.

The young women residents of Margaret Hall are required to board at the Margaret Hall boarding club.

Hospital Fee.—All students living in College buildings, and such others as desire to do so, pay a Hospital fee of \$2.50 per semester. (See College Hospital).

Diploma Fee.—A diploma fee of \$5.00 is payable before graduation.

Text Books.—All text books and stationery may be purchased at the College Book Store at about 20 per cent below the average retail price

ADVANCED STANDING

Students of other colleges will be admitted to advanced standing in this college under the following conditions:

First, they must present a letter of honorable dismissal;

Second, the entrance requirements to the college must be fully satisfied (see admission from other colleges under Entrance Requirements);

Third, students of other colleges will be admitted and granted such credits as their work will justify. Work of recognized merit that has been taken at Colleges and Universities of good rank and standing will be credited for an equivalent amount of work so far as it applies in any of the courses offered at this College. Students taking up work in this way will consult the Heads of the Departments to ascertain the credits to be allowed. These credits may, at the option of the Heads of the Departments, be conditioned on satisfactory work by the student during the first term in College;

Fourth, standings accepted by any Head of Department from any other College or University, shall be certified to the Recorder as "Accepted from College" or "Accepted from University," and these acceptances, after being verified by the Recorder, shall be so recorded in lieu of the regular standings;

Fifth, it is required that all credits from other institutions be sent by the proper officers of such institutions, duly certified, to the Recorder of this College, such certificates to include the number of weeks the student has pursued the studies in question and the number of hours' credit received in each term, as well as the portion of the subjects covered.

Sixth, advanced or college credit may be given for extra high school or secondary school work only on the following conditions:

1. The number of units reported and accepted must be in excess on 16.
2. There must be a **rigorous** examination for college credit.

CLASSIFICATION AND STANDINGS

Junior and Senior College.—The students are now classified in "Junior and Senior Colleges." The Junior College is composed of all students in the Freshman, and Sophomore years: the Senior College, of all students in the Junior and Senior years.

Amount of Work.—The amount of work in each course is expressed in hours, *an hour* meaning one recitation or its equivalent per week throughout the semester. It is considered that one hour's recitation or lecture will require as much time in the preparation, and hence is equivalent to a three-hour laboratory and receives the same credit. Any two-hour laboratory period is equivalent to two-thirds of a three-hour laboratory.

Number of Hours.—No student shall be allowed to classify in more hours than are specified in the catalogue for the semester of the course taken unless he has an exceptionally high record in his previous college work. The taking of such additional work is subject to the approval by the Dean under whom the student is classified and the Heads of the Departments in which the student is classified.

In general, students failing in any portion of a term's work will not be allowed to take full classification for the next semester.

Classification.—No student shall be admitted to any class or dropped from it, except by authority of the Classifying Officer.

Conflicts.—Students shall not classify in conflicting studies without the approval of the Classifying Officer and Heads of the Departments in which the student wishes to enroll.

Standing.—All the standings are based on the scale of 100. The passing grade is 75. A student receiving from 60 to 74 per cent inclusive in any course is conditioned, and allowed to make up the condition under the direction of the head of the department.

Back Studies.—Students shall be classified in back studies in all cases in which such studies are taught, subject to the first rule under **Number of Hours**. Any exception to this rule must be for good and sufficient reason, approved by the President of the College and the Dean or Head of the Department in which the student is enrolled.

Changing Course.—A student will not be permitted to change from one course to another who has a condition or not pass in a subject not common to the two courses; or if he has more than one condition or not pass in subjects common to the two courses.

No student shall be considered a candidate for graduation who has not at the beginning of the second semester of the Senior year completed his work to within the maximum number of hours regularly allowed in his course for that semester. If the uncompleted work is not offered in the second semester, it shall be passed and reported to the Recorder not later than April 1st.

EXAMINATIONS IN BACK WORK

Examinations for back work for matriculated students will be conducted at the opening of each semester, on the Tuesday and Wednesday preceding classification days.

Tuesday

- 8-10 A. M.—Farm Crops.... Farm Crops Lecture Room, 307 Hall of Ag.
- 8-10 A. M.—Mining Engineering..... Room 306, Engineering Hall
- 8-10 A. M.—Zoology..... Zoological Lecture Room
- 10-12 A. M.—English..... Rooms 1 and 3, Central Building
- 10-12 A. M.—Civil Engineering..... Room 312, Engineering Hall
- 1- 3 P. M.—Mech. Engineering..... Rooms 204 and 205, Eng. Hall
- 2- 4 P. M.—History..... Room 208, Central Building
- 3- 5 P. M.—Public Speaking..... Room 308, Central Building
- 3- 5 P. M.—Electrical Engineering..... Room 207, Eng. Hall

Wednesday

- 8-10 A. M.—Horticulture..... Hort. Lecture Room 208, Hall of Ag.
- 8-10 A. M.—Chemistry..... Room 29, Chemical Hall
- 8-10 A. M.—Mathematics..... Room 221, Central Building
- 8-10 A. M.—Animal Husbandry... An. H. Lecture Room 117, Hall of Ag.
- 10-12 A. M.—Economics..... Room 222, Central Building
- 10-12 A. M.—Dairying..... Dairy Building
- 10-12 A. M.—Botany..... Room 312, Central Building
- 1- 3 P. M.—Civics..... Room 102, Central Building
- 1- 3 P. M.—Mech. Engineering..... Rooms 204 and 205, Eng. Hall
- 1- 3 P. M.—Domestic Economy..... History of Art Room
- 2- 4 P. M.—Modern Language..... Room 119, Central Building
- 2- 4 P. M.—Agricultural Eng.. Agr. Eng. Lecture Room, Agr. Eng. Hall
- 3- 5 P. M.—Soils..... Soils Lecture Room 8, Hall of Agr.
- 3- 5 P. M.—Physics..... Room 207, Eng. Hall

DEPARTMENTS MAINTAINED

Agricultural Chemistry,	English,
Agricultural Engineering,	Farm Crops,
Agricultural Journalism,	Forestry,
Agronomy,	Geology,
Animal Husbandry,	History,
Bacteriology,	Home Economics,
Botany,	Horticulture,
Chemistry, General and Applied,	Literature and Rhetoric,
Civil Engineering,	Mathematics,
Dairying,	Mechanical Engineering,
Economic Science,	Military Science,
Electrical Engineering,	Mining Engineering,
Music,	Science and Agriculture,
Modern Languages,	Soils,
Physics and Illuminating Engineering,	Veterinary Medicine,
Psychology and Ethics,	Zoology.
Public Speaking,	

GOVERNMENT

The relations of our College buildings, and the nature of the exercises, complicated as they are, by laboratory work, shop practice, and labor, make order, punctuality, and systematic effort indispensable. The institution, therefore, offers no inducement to the idler or the self-indulgent. All who are too independent to submit to needful authority, too reckless to accept wholesome restraint, or too careless to take advantage of their opportunities, are advised not to come. The discipline of the College is confined mainly to sending away those who prove, on fair trial, to be of this class. The final decision of all cases of discipline shall rest with the President of the College except when he delegates such power in particular cases to the Deans or to some one of the standing committees of the faculty.

MANUAL LABOR

The following regulations in regard to manual labor have been adopted by the Board of Education:

1. The manual labor of students is divided into two kinds: viz., un-instructive labor, which shall be paid for in money; and instructive labor, which shall be compensated by the instruction given and the skill acquired.

2. Uninstructive labor shall comprise all the operations in the workshop, the garden, upon the farm, and elsewhere, in which the work done accrues to the benefit of the College, and not to that of the student. Instructive labor shall embrace all those operations in the workshop, museum, laboratories, veterinary hospital, experimental kitchen, upon the

farm, garden and experimental stations, in which the sole purpose is the acquisition of knowledge and skill.

3. Students shall engage in instructive labor in the presence of the professor in charge, and under his instruction according to the statement made in each of the courses of study.

The compensated labor furnished by the Divisions of Agriculture, of Veterinary Medicine, and of Engineering, is given by each to its own students and is eagerly sought. The "details" of compensated labor supplied by the needs of the various departments are given to the most faithful and meritorious students in each department. Uninstructive labor is paid for according to its value to the College, but no student should expect to pay the main part of his expenses by labor while here. The College cannot furnish the work, and, even if it could, the student's time is *needed chiefly for study*. Still, many worthy and industrious students pay a considerable part of their expenses by labor, over \$4,000 being paid out by the College thus each year to students and post-graduate assistants.

GRADUATING THESIS

All candidates for graduation in the Engineering and Agricultural courses are expected to present a satisfactory thesis.

The subjects for theses shall be selected under the direction of the professor in whose department they are written, and submitted to the Thesis Committee, with signed approval of the professor, on or before the first Monday in October.

It is expected that each thesis shall represent an amount of work equivalent to at least one exercise per week through the Senior year; that it shall show the result of the student's personal study or investigation and be throughout original in matter and treatment so far as the nature of the subject will permit; that it shall be prepared under the supervision of the professor in charge, the student making frequent reports of progress and having an outline of matter ready for approval by the first week of the last semester.

The complete thesis shall be submitted to the Thesis Committee on or before May 25th.

COLLEGE HOSPITAL

The actual sanitary condition of the College is excellent. The buildings are situated on high ground with good natural drainage. The water supply is exceptionally pure and abundant. The sewer system and sewerage disposal plant are the best that modern sanitary engineering can devise. Nevertheless in this, as in other like institutions, whose students are drawn from a wide territory, various diseases are brought by the students themselves. In order to control epidemics and properly to care for other cases of illness or injury, a hospital is provided. This hospital is under the charge of the College Physician, assisted by a professional nurse, a competent housekeeper, and a student hospital steward.

The expenses of the hospital are defrayed from a fund accruing from the hospital fees paid by students. A hospital fee of \$2.50 per semester is required of all students living in College buildings. The privileges of the hospital are also extended to students not rooming in the College buildings, provided: 1st, that the physician shall be paid for calls at their residences; and, 2d, that the usual hospital fee shall be paid within the first ten days of the student's arrival. Students not making the hospital deposit will be admitted to the hospital upon the basis of \$10.00 per week, within the discretion of the College physician. The hospital fee insures to the payer thereof, medical attendance, nursing, and medicine, in illness or accident; and consultation and medicine for minor ailments in accordance with the regulations herein published. The charges named are based upon the probable actual cost of medical attendance and hospital service, and the fund created is carefully devoted to these purposes. The College can not assume any liability beyond the extent of the fund so created. The hospital has proved to be a great blessing to the students.

The following regulations apply to the privileges of the hospital:

1st. Students entering the hospital shall be charged \$3.00 per week for board, room, light, and heat. But for any time in excess of three consecutive weeks per term spent in the hospital, an additional charge above that mentioned shall be made of \$4.00 per week.

2d. In case a special nurse or physician is employed, the expense shall be borne by the particular patient, the selection of such nurse or physician to be approved by the College physician.

3d. The College assumes no responsibility whatever in case of small-pox; nor shall the privileges of the hospital be extended to such cases.

4th. The President and the College physician may require of students entering the college a certificate of a reputable physician showing successful vaccination.

5th. The College physician is authorized to exclude from the College dormitories and recitation rooms any person afflicted with a contagious disease.

COLLEGE LIBRARY

The College Library, consisting of over 32,000 volumes and of about 35,000 pamphlets, is chiefly a library of reference, containing standard and technical works bearing particularly upon the lines of study pursued in the College. Magazines, periodical literature bearing upon the special work of the students, and daily papers are furnished for the use of the students. The reading room of the library is open eleven and one-half hours daily except Sunday, when it is open three hours. Personal assistance will be given by the librarian and her assistant to any who desire help in reference work.

A few years ago the College received by bequest about 1,500 volumes pertaining to Engineering and Economics from the library of the late



Dairy Building



The Churn Room

Geo. W. Catt. This Engineering Library, with that section of books from the general collection, has been made a Departmental Library, located in Engineering Hall. An Agricultural Library has been established, also, in the New Hall of Agriculture.

RELIGIOUS LIFE AT THE COLLEGE

ORANGE HOWARD CESSNA, CHAPLAIN

M. H. BRICKHAM, GENERAL SECRETARY, Y. M. C. A.

MISS MILDRED JONES, GENERAL SECRETARY, Y. W. C. A.

Although we have here a state school, and hence one non-sectarian, the College life is dominated by religious influences.

The Young Men's and Young Women's Christian Associations, Bible Study Classes, and Mission Classes, consisting of members from both faculty and student body, have a helpful influence not only upon the religious but also upon the social life of the College. The members of the Association assist in the reception of the new students and in the maintenance of religious work.

The work of each Association is under the direction of a general secretary. These two Associations are now located in their new home, "Alumni Hall," which was constructed at an expense of \$60,000.00, by funds donated by the alumni, students, instructors, citizens, and friends. This home is the center of the religious and social life of the College and as a building for such purposes it is not excelled in the West.

The faculty and students assemble daily in the Chapel at 9:40 A. M. for public worship. On each Sunday morning at 10:45, Chapel exercises are conducted by some prominent clergyman invited for the occasion. In all these services, the object is to emphasize the principles of morality and of Christian religion.

There are ten different denominational churches in Ames, all of which are closely in touch with the students and cordially invite them to take part in all religious services.

ALUMNI ASSOCIATION

The Alumni Association of the Iowa State College was organized in 1876. Its purpose is to promote the highest interest of the institution and to increase friendship and sympathy among students and alumni.

The present officers of the Association are: Honorary President, E. W. Stanton, '72, Ames, Iowa; President, O. J. Henderson, '98, Webster City, Iowa; Vice-President, Merritt Greene, Jr., '05, Marshalltown, Iowa; Secretary, Maria M. Roberts, '90, Ames, Iowa; Treasurer, Mrs. Julia Wentch Stanton, '88, Ames, Iowa; Historian, Mrs. Mary McDonald Knapp, '83, Ames Iowa; Executive Committee, O. J. Henderson, '98, Maria M. Roberts, '90, Mrs. Julia Wentch Stanton, '88, Dr. Benjamin Horace Hibbard, '98, and Harry F. Brown, '98; and Business Manager of Alumnus, Ward M. Jones, '97, Ames, Iowa. The annual meeting and banquet are held on Wednesday and Thursday of Commencement week. A local asso-

ciation was organized in April 1903, in order to arrange for the annual meetings and to keep the alumni in close touch with one another. Branch associations have been organized in Des Moines, California, Colorado, Washington, D. C., New York, Milwaukee, Pittsburg, Chicago, Philippine Islands, Salt Lake City, Schnectady, St. Louis, Kansas City, Waterloo, Seattle, and Canada.

Alumni Hall adds much to the Association, as it affords a place where the alumni may meet when visiting their Alma Mater.

COLLEGE PUBLICATIONS

1. Catalogue, published in February, and giving general information about the College and its several departments.
2. College Compendium, an illustrated catalogue of the school.
3. Special announcements of the Agricultural, Veterinary, and Engineering divisions, and of the Short Course and Good Roads School, one bulletin being published each month.
4. Bulletins, recording the results of experimental studies carried on by the Agricultural and the Engineering Experiment Stations.

STUDENT AND ALUMNI PUBLICATIONS

1. The Student, a weekly paper, published by a staff elected from the student body and devoted to the recording of such matters as pertain to the interest and welfare of the school.
2. The Bomb, an annual published by the Junior Class.
3. Iowa Agriculturist, published monthly by the Agricultural Club of the Iowa State College.
4. Iowa Engineer, published bi-monthly by the Engineering Association.
5. The Alumnus, a monthly publication, devoted to and published by the Alumni Association.

LITERARY SOCIETIES

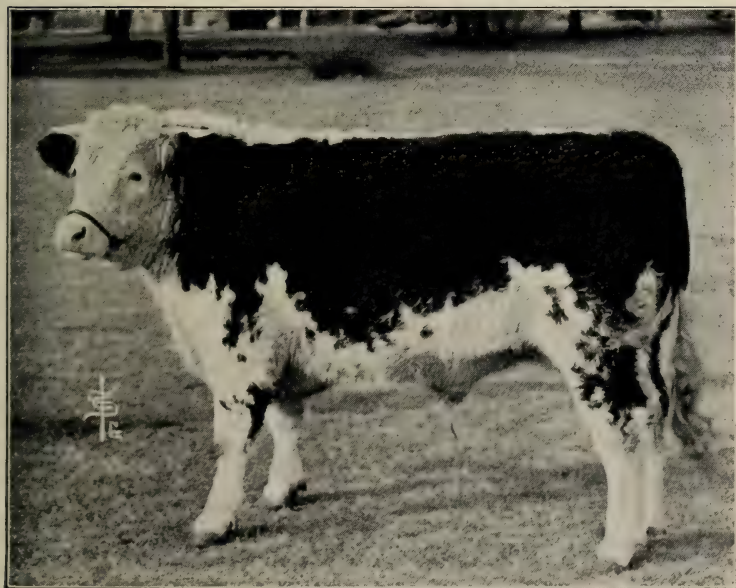
The work of the eleven literary societies serves not only to supplement the social and literary work of the College, but also to aid the student in securing that training so necessary to enable one to appear before an audience, that training which every student needs and which cannot be secured in the class room alone. It is the purpose of the officers of the College to keep each Friday evening open that the work of these societies may go on without interruption. Every student is invited, even urged, to join one of these societies.

FORENSIC LEAGUE

The Forensic League is an organization composed of two representatives from each of the eleven Literary Societies of the College, and three faculty members representing the Public Speaking, English, and Economics Departments respectively. The function of this organization is to



Black Rock—International Grand Champion of 1905



Defender—International Grand Champion of 1906

manage the Forensic interests of the College. These interests include intersociety and intercollegiate debates, and intersociety and intercollegiate oratorical contests, intersociety declamatory contests, joint public programs and Literary Society graduation exercises. There are intersociety debates each semester calling out four students from each society. During the fall semester a dual debate is held with the Iowa State Teachers' College thus calling out six debaters from each school. The triangular intercollegiate debate with Drake University and Iowa College held during the spring semester also calls out six students to represent the Iowa State College.

Intersociety oratorical contests are held each fall semester and declamatory contests each spring semester, each society having one representative. The winner in the intersociety oratorical contest represents the College in the annual state intercollegiate oratorical contest.

MUSICAL ORGANIZATIONS

The College maintains a Choral Society (membership being open both to students and to citizens of Ames), a College Choir, a Glee Club, and a Ladies' Glee Club, all of which give frequent concerts and recitals. The musical organizations are under the supervision of the Director of Music.

A College Band of thirty-two pieces is maintained under the instruction of Charles L. Mundhenk, a member of the Iowa State Band of 1893. This band furnishes music in connection with the Military Department and also for all athletic and student assemblies.

Graduate Courses

The Iowa State College offers the Master's degree in Agriculture (M. S. in special line in Agriculture) to Bachelors of Science in Agriculture who are graduates of this College or to others offering equivalent courses of study, the degree of Master of Science (M. S.) to Bachelors of Science who are graduates of this College or of other colleges offering equivalent courses of study, the degree of Master of Science in Agricultural Engineering (M. S. in A. E.) to Bachelors of Science in Agricultural Engineering who are graduates of this College or of other Colleges offering equivalent courses of study, and also Professional degrees in Engineering.

MASTER'S DEGREE

The opportunity for resident study after graduation is a privilege granted only upon the recommendation of the President with the advice and consent of the Committee on Post-Graduate Study and the professors in charge of the departments in which the studies are to be pursued.

The candidate shall spend at least one academic year in residence. If only one year is spent in residence, the candidate shall devote his entire time to his post-graduate studies, except in cases where work previously done *in absentia* is accepted at the beginning of the student's residence by the Professor in charge of the major subject. Such *in absentia* work shall constitute not more than one-half of the required work. In the case of graduates of this college, temporary leave of absence for special study elsewhere may be granted during the year's residence. In order to be entitled to his degree, the candidate must meet within four years the requirements existing at the time of matriculation, otherwise he must complete any additional requirements which may be in force at the time of his final examination.

Two lines of work shall be selected, designated as major and minor studies, the former to be given two-thirds and the latter one-third of the time. The major study shall be research work, the results of which shall be incorporated in a thesis. The major and minor studies shall be so selected as to support and strengthen each other. No under-graduate study shall be selected as a major study. Under-graduate studies may be taken for part of the minor work only with the approval of the Committee on Post-Graduate Study, and the heads of the departments in which the work is to be done. The candidate shall have a reading knowledge of French or German.

Application for graduate study, specifying the departments in which the major and minor subjects are to be taken, shall be filed with

the President within four weeks of the beginning of the first term's resident work, which, in all cases, shall be not later than October 1st, next preceding the commencement at which the degree is to be granted.

A detailed outline of the work to be done in the major and minor subjects approved by the heads of the departments in which the work is to be taken shall be filed with the Committee on Post-Graduate Study, within eight weeks of the opening of the semester in which resident work is begun.

The candidate for the master's degree shall apply in writing for examinations not later than May 1st; and such examinations shall be given not later than May 15th.

Graduates of other institutions desiring to become candidates for post-graduate degrees in this institution shall be required to show to the Committee on Post-Graduate Study evidence of under-graduate work equivalent to the corresponding course in this institution, and if any deficiency appears in the subjects elected for post-graduate work, to make up such deficiency.

Candidates for advanced degrees are expected to appear on the Commencement stage to receive such degrees.

FEEES

A matriculation fee of fifteen dollars (\$15.00) is charged to all graduate students. This fee is paid at the Treasurer's Office and the receipt shown to the chairman of the Post-Graduate Committee at the time of first registration.

Laboratory fees are charged in each laboratory for the material used, the amount being arranged with the Head of the Department.

Diploma fee for Master's Degree or Professional Degree is five dollars (\$5.00).

GRADUATE WORK IN AGRICULTURE

AIMS AND METHODS

It is the aim of the College of Agriculture to furnish facilities for advanced study commensurate with the demand. By means of this advanced work the College seeks to awaken in the minds of capable men and women an appreciation of research and the advancement of learning, to the end that they may effectively aid, not only in the teaching of agriculture, but also in extending the boundaries of agricultural knowledge. Nearly all of the best positions open in agricultural research and instruction work now require post-graduate training.

The College of Agriculture aims to give advanced instruction of a high character in each of its departments. No set courses of study leading to the Master's degree are provided, but each candidate for this degree pursues an independent line of special research, original in character, outlined with the advice of the professors, and carried out under their direction. Seminars are largely employed and especial efforts

are made to bring the graduate student into contact with the research problems of his department of study. To this end capable students often take a part in the investigation work of their instructors.

EQUIPMENT

The College of Agriculture is well equipped for Graduate work. Each of the departments is provided with commodious laboratories which are fitted up with apparatus and equipment of the most approved design. In addition, large herds and flocks, a large number of field plots devoted to soil and crop investigations, and extensive orchards and plant breeding grounds offer the student excellent facilities along Animal Husbandry, Agronomy and Horticultural lines. The Dairy and Agricultural Engineering departments have buildings and equipment which are unsurpassed for work in their respective fields. A splendid library has recently been installed in the new Hall of Agriculture which provides unusual facilities for graduate students. Within the past few years hundreds of valuable books containing the results of the most noted foreign investigators have been added to this library.

In the following pages will be found grouped together the lines of agricultural work which are offered graduate students.

FARM CROPS

Graduate work in Farm Crops comprises investigation of biological phenomena of growing crops, with a view to recognizing the operation of the laws of plant breeding. It also includes an opportunity for investigation of station methods and for putting them into practice.

Cereal Breeding: An opportunity is given through the records of the Experiment Station, and through actual work in progress on the experimental field, to investigate the operation of the laws of plant breeding as applied to farm crops. This investigation will include an extended study of correlations of characters in growing strains of corn and small grain. A study of the transference of characters in generations of plants of hybrid origin gives an excellent opportunity for tracing Mendelian principles.

Experiment Station Methods: Special opportunity for practice in experiment station methods of conducting scientific tests of farm crops are offered on the extensive experimental grounds of this institution. Besides making a study of the methods in vogue at this station, an opportunity is given for an investigation of the methods in operation at other leading experiment stations of this country.

General Crop Problems: Unsolved problems of growth and the harvesting and storage of the several cereal crops offer inviting lines for valuable research. The commodious laboratories of the Farm Crops Department, equipped with the best apparatus available, enables the investigator in this line to conduct satisfactory, scientific research into the many important unsolved problems.

SOILS

Graduate work is offered in Soils which prepares the student for special work in the United States Bureau of Soils or in Colleges and State Experiment Stations. The work may be a continuation of work taken as an under-graduate in this College or of any line of soil study which has fitted the student to take up advanced work.

The graduate student will find excellent opportunities for investigations in soils along the following lines:

Soil Physics: Research in special subjects bearing on the physical characteristics of soils and their relation to crop production.

Soil Fertility: Special investigation of the factors which control the productive capacity of soils.

Soil Bacteriology: Original investigations of important problems in Soil Bacteriology, the department offering unusual opportunities along this line, especially in connection with the humus investigations which are now in progress.

Research in Soil Management: Investigations of the principles governing successful systems of soil management. Special studies relating to the management of particular soils such as gumbo, peats, sands, and alkali soils.

Seminar: Special investigation bearing on selected lines in Soils. The preparation and presentation of papers for discussion by the class.

DAIRYING

Graduate work in dairying can be taken along any one of the following lines:

Buttermaking: The large, well equipped factory offers abundant opportunity for anyone desiring to specialize along this line. It gives facilities for advanced work in cream ripening, pasteurizing, starters, churning, separating, etc.

Creamery Management: Under this head investigational work is done along such lines as; cost of manufacture, economical methods of purchasing cream and supplies, disposal of the by-products of the factory, and improved methods of creamery accounting.

Cheese Making: The large, well equipped cheese room and cold storage rooms connected with it make a very complete laboratory in which to carry on investigational work in comparing different methods of making, curing and storing various kinds of cheese.

Testing Dairy Products and Milk Inspection: These subjects offer a great field for research, including comparisons of quick methods of analyzing the various dairy products with the well established official method and a study of improved methods of testing for preservatives and adulterations.

Advanced Work in Dairy Bacteriology: This work consists of laboratory investigation of problems along dairy bacteriology lines and assigned reading. The nature of the work is designed to fit the individual student.

ANIMAL HUSBANDRY

Graduate work in Animal Husbandry may be taken along any of the following lines:

Animal Nutrition: Because of the large number of horses, cattle, sheep and swine-feeding experiments which are being conducted on the College Farm, the opportunities for doing research work in this line are unequalled.

Animal Breeding: Includes special work along new and original lines pertaining to principles underlying Animal Breeding.

Study of Breeds: With not only typical specimens, but also, in most cases, complete breeding herds of almost every recognized breed of live stock on the continent, the post-graduate student is offered unexcelled opportunity for studying breeds adapted to Iowa conditions.

Stock Judging: For this work, all the various market types of animals and good representatives of pure breeds are available. These are carefully studied on foot, then slaughtered for a block test and the exact percentages and values of various cuts determined.

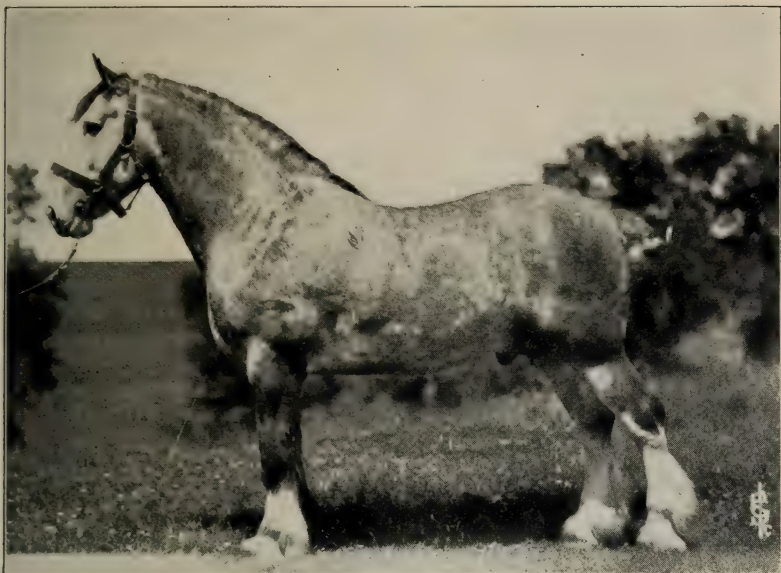
Practical Management of Stock: This consists of a study and investigation of the methods employed on the best managed stock farms and breeding establishments in the United States, Canada, Great Britain, and other countries. Students are thus prepared to manage stock farms.

POULTRY HUSBANDRY

Because of the newness and great scope of the field, Poultry Husbandry offers many opportunities for doing valuable research work. Unexcelled opportunities are offered for the common application of training which the student may have received in embryology, bacteriology, physics, zoology, entomology, farm architecture, etc. Some of the lines along which the student may work are:

Breeding: Because of the shortness of generations and the widely varying characteristics in color and shapes of varieties, poultry offers unexcelled opportunities for study of unit characters in crossing and in applying the laws of heredity. Work may also be done along the lines of breeding for meat type and increased egg production.

Feeding: Comparative studies are made of different rations for laying and breeding stock, rearing and fattening, or finishing. Comparison is made of breeds in regard to gains made on certain rations. Tests are also made of the effect of feeding on color of feathers or composition of flesh and eggs.



International Winners Used in Government Horse Breeding Work at Ames

Housing: The work covers comparison of glass front, curtain front, or combination glass and curtain front houses; a comparison of large and small flocks; a study of colony houses and of poultry house sanitation.

Incubation: This branch of the industry is in great need of investigation because of its vast importance and the little knowledge we now have of its laws. Such lines of work could be taken up as: effect of moisture or non-moisture methods on the fertility of eggs and the vitality of chicks; value of carbon dioxide in incubation; study of natural methods; loss in weight in incubation; change in the structure and density of the shell; selection of chicks as they hatch for constitutional vitality; difference in incubation management for eggs of different classes of poultry.

Brooding and Rearing: Brooding in large versus small flocks; natural versus artificial brooding; study of brooder diseases; effects of temperature on health and growth of chicks—all these are part of the course.

Poultry Diseases and Pests: This includes a study of cholera, sorehead, black head, roup, and other poultry diseases with a view to prevention and cure, and also a study of lice, mites, rats and other pests, with a view to their extermination.

HORTICULTURE AND FORESTRY

Graduate students find here opportunity for investigation in Horticulture and Forestry in the following subjects. Work in Forestry is offered for minor subjects only:

Plant Breeding: The investigation of principles and methods of plant breeding. The plant breeding work of the Iowa Experiment Station is continually developing an abundant supply of material for the study of heredity, variation, and selection, particularly with the apple.

Plant Propagation: The greenhouses, garden, and orchards are available for investigations concerning the principles and technique of plant propagation.

Pomology: A special study of horticultural species with reference to their original geographical distribution, to their variation under cultivation, and to the development of distinct types and economic importance.

Research: Problems for horticultural investigation other than those suggested above, undertaken in special lines for which the students may be best prepared.

Forest Botany, or Dendrology: Systematic and biologic forest geography.

Silviculture: The methods of producing a forest crop and of influencing its progress.

Wood Technology and Timber Physics: The structural and physical characters of woods, with the application of wood in the arts, with

its requirements and working properties, and with the use of minor and by-products.

Forest Economics: A study of the relation of forests to climate, soil, water, health, ethics, etc. This is a study of commercial peculiarities and of the positions of forests and forestry in political economy.

Forest Mensuration: Methods of ascertaining volumes and rates of growth of trees and stands of determining yields.

AGRICULTURAL ENGINEERING

Students may take up graduate work along any of the many lines of Agricultural Engineering. This training will prepare them for government positions in agricultural engineering lines, for teaching in agricultural colleges, or for becoming managers or superintendents of farms. Investigation may be carried on along any special lines which they are fitted to pursue. The following subjects are suggested:

Irrigation: Studying the principles employed and the machinery used and its efficiency, also practical work in sewage irrigation on the College Farm.

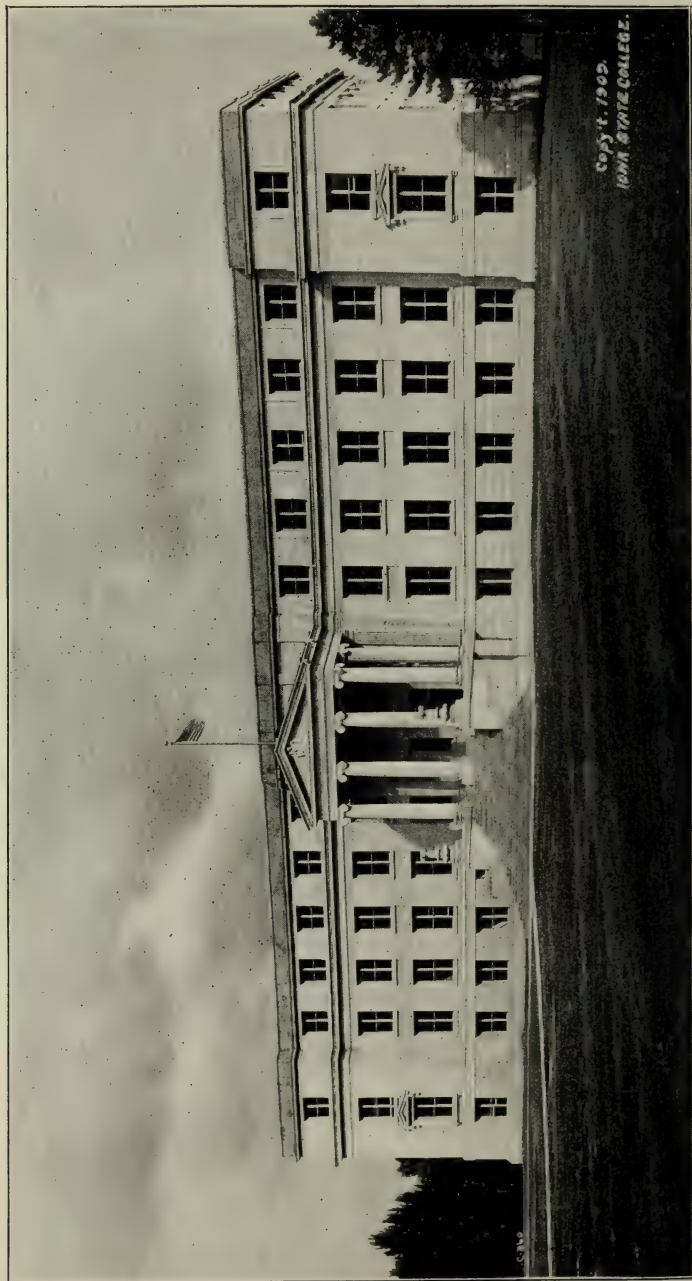
Farm Architecture: The locating, designing, constructing, drawing up specifications and contracts, and estimating cost of all farm buildings.

Road Construction: Intended to fit students for highway engineers.

Investigation of Farm Implements: Their construction and efficiency, also comparison of different makes. The department, having an equipment of \$20,000.00 worth of modern implements, offers splendid opportunities for this line of investigation.

Farm Motors: The efficiency of steam traction and gasoline engines, also a comparison with the horse as power.

Drainage: Intended to fit students for drainage engineers. The co-operative experiments of this department with the United States Department of Irrigation and Drainage Investigation, furnish a good opportunity for study along this line.



COPY 't. 1903.
JOHN STATE COLLEGE.

Hall of Agriculture

Division of Agriculture

CHARLES FRANKLIN CURTISS, DEAN

SPENCER AMBROSE BEACH, VICE-DEAN

The division of Agriculture offers to its students work in any of the following courses:

Course in Agronomy.

Course in Dairying.

Course in Animal Husbandry.

Course in Horticulture and Forestry.

Course in Agricultural Engineering.

Course in Science and Agriculture.

Course in Home Economics.

These courses are so arranged as to furnish a good foundation from which a student may become either a successful farmer or may develop into a specialist in one of the many branches of the agricultural industry. The department offers short as well as the regular four year courses, the difference being due largely to the degree in which the student wishes to specialize in any line of work. The farm as it is usually conducted is a union of many divisions of industry, and the shorter course confines itself to laying a foundation that will secure success in all of these, while the longer course seeks to direct the student into that line which will call forth and centralize his special ability and at the same time enable him to meet the variety of conditions that under all circumstances surround a successful life.

Past experience with these courses shows that they have met with more than usual success in attaining their objects; as the shorter course has been productive of many successful farmers, and the longer course has been unusually successful in developing better farmers and more capable men in practical life and also in securing for our graduates prominent positions in the agricultural faculties of other colleges.

In the courses in practical agriculture, a field of work which is unsurpassed by any other college in the United States is open to our students. The national government gives to the college about thirty-five thousand dollars annually for original experimentation and instruction in agriculture and the sciences related to this industry. This, supplemented by liberal state aid, enables the College authorities to make the fields and the barns veritable laboratories of extensive and most practical investigation and observation. The range is from the soil, which produces, through all of

its natural characteristics, to whatever is grown in agriculture from germ to finish.

The farm, consisting of 1,200 acres of rolling prairies, bottom and woodland, is stocked with good representatives of six breeds of horses, seven breeds of cattle, seven breeds of sheep and six breeds of hogs. These animals are used in class illustration and for the various experiments in breeding and feeding for milk, meat, wool, growth and maintenance, conducted by the Experiment Station as a department of the College. All the crops are grown for some educational purpose; all the animals are fed by rule and system, and the result of their management reported upon and used in class work.

Two commodious, well-lighted stock judging pavilions have recently been constructed, into which live animals are brought in the presence of the teacher and the class for careful study and intimate knowledge. An experimental barn with the recent and most approved methods of stalls, feeding and ventilation, is devoted exclusively to the original work of animal husbandry and agronomy, the work ranging over all the questions of breeding and maturing domestic animals.

The work of this department is designed to teach the sciences that underlie practical agriculture, and sufficient English, literature, mathematics, history, and other supplementary studies to sustain both scientific and practical agriculture and to develop the agricultural students to the level of the educated in any profession. Special attention is given to the improved methods in all of the various operations of farming, farm building, use of tools and machinery, and management of all kinds of stock and crops. The instruction embraces not only the principles, but also the practices of agriculture.

AGRICULTURAL COURSES

All students classified in the courses in Agronomy, Dairying, Animal Husbandry and Horticulture will take the same work until the beginning of the Sophomore year, when the selection of the desired course will be made by the student. Students classified in the courses in Agricultural Engineering and Science and Agriculture will take the Freshman work as shown in the list of studies given for those courses.

*Freshman Year

FIRST SEMESTER

		Required Semester Hours
Agricultural Chemistry 21,	General Chemistry	4½
Agricultural		
Engineering 1or 2,	Shop Work	1½

* Freshmen who show deficient preparation in Mathematics may be assigned by the Dean of the Junior College and the Dean of Agriculture, to a special class, with one hour more work than indicated above, and in case of clear indication of failure even with this arrangement they will be dropped from the Freshman work until they have given proof of sufficient preparation to enable them to carry the work successfully.

Animal Husbandry 1,	Market Types of Cattle and Sheep	2
Botany 61,	Morphology	1 $\frac{2}{3}$
Farm Crops 1,	Corn Growing and Judging	2 $\frac{2}{3}$
Horticulture 3,	Orcharding	2 $\frac{2}{3}$
Mathematics 17,	Algebra and Trigonometry	3
Veterinary 56,	Anatomy of Domestic Animals	1
Military 1,	Military Drill	R
Library 1,	Library Instruction (4 hours during semester)	R
		—
	Total semester hours	18 $\frac{2}{3}$

SECOND SEMESTER

		Required Semester Hours
Agricultural Chemistry 23,	General Chemistry	4 $\frac{1}{3}$
Agricultural Engineering 1 or 2,	Shop Work	1 $\frac{1}{3}$
Animal Husbandry 2,	Market Types of Dairy Cattle, Horses and Swine	2
Dairying 12,	Farm Dairying	2 $\frac{2}{3}$
Farm Crops 2,	Small Grains	2 $\frac{2}{3}$
Forestry 1,	Farm Forestry	2
Physics 205,	Mechanics, Heat and Light	3
Military 2,	Military Drill	R
		—
	Total semester hours	18

Department of Agronomy

WILLIAM HENRY STEVENSON, PROFESSOR

HAROLD DE MOTT HUGHES, PROFESSOR OF FARM CROPS

JOSEPH F. BARKER, ASSISTANT PROFESSOR OF SOILS

HARRY BLAINE POTTER, ASSISTANT PROFESSOR OF FARM CROPS

PERCY EDGAR BROWN, ASSISTANT PROFESSOR OF SOIL BACTERIOLOGY

ROY EUGENE SMITH, INSTRUCTOR IN SOILS

WILLIAM ROY HECKLER, INSTRUCTOR IN FARM CROPS

HARRY VINCENT CALDWELL, INSTRUCTOR IN FARM CROPS

ADDISON H. SNYDER, SOIL EXTENSION WORK

MARTIN LUTHER MOSHER, FARM CROPS EXTENSION WORK

MURL McDONALD, ASSISTANT, FARM CROPS EXTENSION WORK

Agronomy is the science of the Field and its crops. It treats of Farm Management, the application of economic business methods to farm practices; Field Crops, their classification, production and improvement; Soils,

their fertility, cultivation and improvement. The Department of Agronomy consists of the two coördinate Departments, Farm Crops and Soils.

The added facilities of their admirable quarters in the Hall of Agriculture enable the Agronomy Department to offer work in accord with the demands of the times. Commodious and well lighted class-rooms, with new and well equipped research laboratories, offer the best of facilities for lecture and laboratory work.

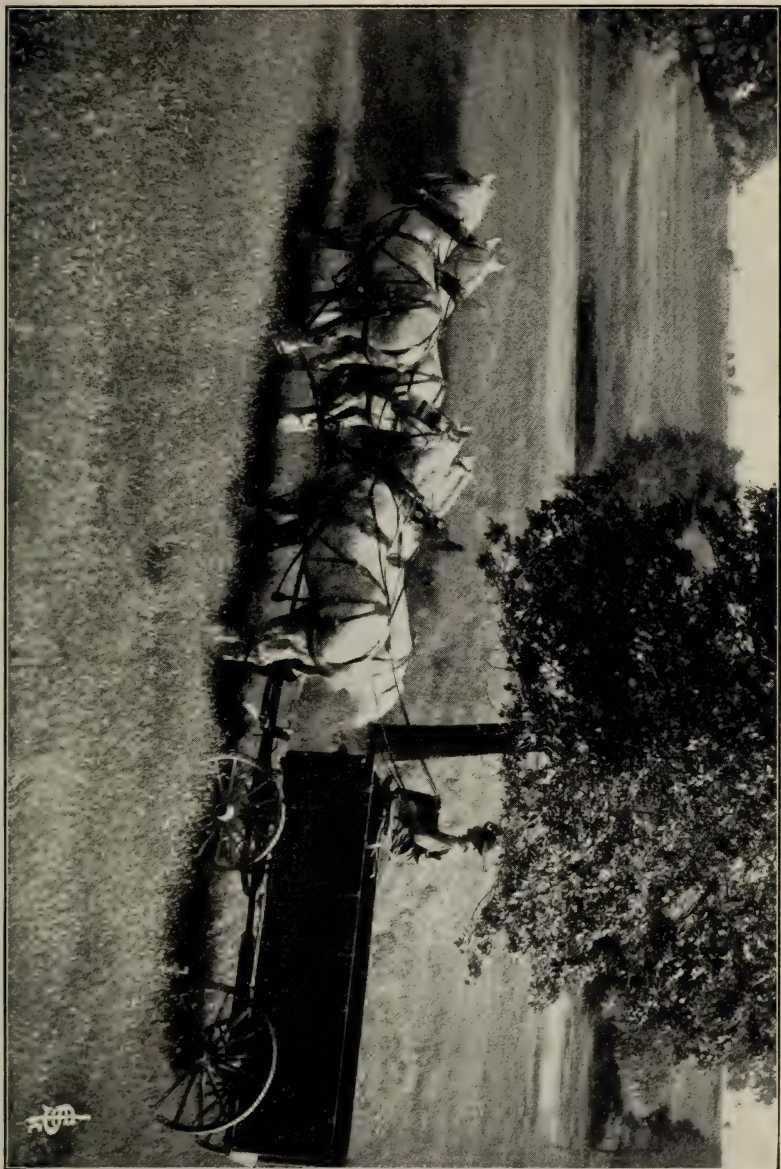
The general elementary work in cereal study is conducted in the grain laboratory on the second floor of the stock and grain judging pavilion. The higher and more scientific study of crops is pursued in the corn and small grain laboratories on the fourth floor of the Hall of Agriculture. Research laboratories, equipped with chemical and general apparatus used in biological research, offer special opportunities for investigation to graduate students.

The increased demand for competent farm managers has far outrun the supply. The demand is increasing for trained men in farm crops, to fill positions as teachers of agriculture in secondary schools, assistants in seed houses, and assistants on the editorial staffs of agricultural journals. The number of men well trained in farm crops, who are putting in operation on the farm the principles and practices studied in college, is annually increasing. Many men who have taken special training in farm crops production and breeding, have returned to their farms, where they are making a profitable specialty of raising pure-bred corn or small grain.

A knowledge of the fundamental principles which underlie all successful systems of soil management should be the possession of every farmer. Without this knowledge he cannot produce maximum crops nor successfully maintain the fertility of his soil. And yet no greater obligation rests upon the American farmer than the conservation of our greatest natural resource, namely, the productive power of the land. It is the aim of the Soils Department to teach in a logical way the important principles concerning physical, plant food, and bacteriological soil factors. In order that this work may be carried on successfully, several courses are offered to undergraduate and graduate students, including courses in Soil Physics, Soil Fertility and Soil Bacteriology.

On the first floor of Agricultural Hall, five commodious and well appointed soils laboratories have been thoroughly equipped for accurate and scientific work. Apparatus of the latest design has been installed in these laboratories, thus affording excellent facilities for regular, advanced, and graduate students in Soils. In addition to these excellent laboratory facilities, suitable greenhouses and field plots are available for certain lines of study and experimentation. The Department is also equipped with photographs, charts, and maps which are used in the lecture room and laboratory. Valuable and abundant data, which have been secured by the Soils Section from extensive soil experiments, prove very helpful to students who are especially interested in the problems relating directly to the soils of Iowa.

The work of the department is twofold; first, to fit young men to



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A Farm Draft Team

successfully solve the soil problems which are an integral part of every farmer's experience; secondly, to fit some students to creditably fill positions in Agricultural colleges and Experiment stations and in other institutions in which the subject of Soils is taught. There is a constantly increasing demand for men well trained in Soils.

METEOROLOGY AND CLIMATOLOGY

The object of this course is to give the student a knowledge of the fundamental principles which govern weather and climate. The first half of the semester is devoted to a study of the elementary principles of meteorology. The student is acquainted with the instruments used by the weather bureau; the principles upon which they are based and their care and uses are explained. The last half of the semester is given to a consideration of the fundamental principles which control weather and climate. Throughout the entire course the charts and maps issued by the state and federal weather bureaus are used freely. The student is given practice on the construction and interpretation of charts, and in forecasting. Elective in all Agricultural Courses. See descriptive course under Geology.

COURSE IN AGRONOMY

For Freshman year see Agricultural Course, page 77.

Sophomore Year

THIRD SEMESTER

		Required Semester Hours
Farm Crops 3,	Corn and Small Grain Judging	2
Agricultural Chemistry 25,	Organic Chemistry	3½
Agricultural Engineering 4,	Farm Engineering	3½
Botany 68,	Vegetable Physiology	3½
Animal Husbandry 3,	Breed Types of Cattle and Sheep	3½
English 11,	Exposition	3
Military 3, or Athletics		R
		—
	Total semester hours	18¾

FOURTH SEMESTER

		Required Semester Hours
Farm Crops 17,	Grasses, Forage and Fibre Crops	2
Agricultural Chemistry 26,	Agricultural Analysis	3½
Agricultural Engineering 5,	Farm Machinery and Farm Motors	2½
Animal Husbandry 4,	Breed Types of Dairy Cattle,	
	Horses and Swine	3½

English 10,	Narration and Description	3
Zoology 16,	General Zoology	4 $\frac{1}{3}$
Military 4, or Athletics		R
		—
	Total semester hours	18 $\frac{2}{3}$

Junior Year

FIFTH SEMESTER

		Required Semester Hours
Soils 1,	Soil Physics	4
Choice { *Farm Crops 19,	Seminar	
Choice { *Soils 17,	Seminar	
Botany, 24,	Embryogeny	1 $\frac{2}{3}$
Economic Science 9,	Outlines of Economics	3
Horticulture 33,	Truck Farming	2
Horticulture 4,	Plant Breeding	2 $\frac{2}{3}$
Zoology 4,	Entomology	3 $\frac{1}{3}$
		—
		16 $\frac{2}{3}$
Electives will be selected from the list on page 147	0 to	3 $\frac{1}{3}$
	—	—
	Total semester hours	16 $\frac{2}{3}$ to 20

* These courses must be continued through the year. Final standing will not be certified to recorder until close of sixth semester.

SIXTH SEMESTER

		Required Semester Hours
Soils 2,	Soil Fertility	4
Choice { Farm Crops 9,	Research Work 2}	
Choice { Soils 3,	Research Work 2}	2
Farm Crops 4,	Corn and Small Grain Breeding	1 $\frac{2}{3}$
Bacteriology 1,	General Bacteriology	4
English 12,	Argumentation	2
Choice { *Farm Crops 19,	Seminar 1}	
Choice { *Soils 17,	Seminar 1}	1
		—
		14 $\frac{2}{3}$
Electives will be selected from the list on page 147	1 $\frac{1}{3}$ to	5 $\frac{1}{3}$
	—	—
	Total semester hours	16 to 20

* A continuation of work in fifth semester. Standing will be for fifth and sixth semesters. One hour credit for both semesters' work will be recorded at end of the sixth semester.

Senior Year

SEVENTH SEMESTER

		Required Semester Hours
Farm Crops 8,	Farm Management	3
Soils 6,	Advanced Soil Fertility	2
Soils 8,	Soil Bacteriology	4
Choice { Soils 4,	Research Work 2}	
Choice { Farm Crops 9 or 10,	Research Work 2}	2
Agricultural Journalism 1,	Beginning Journalism	1
Animal Husbandry 20,	Animal Feeding	2
**Animal Husbandry 21,	Principles of Breeding	2
**Horticulture 8,	Landscape Gardening	2
Choice { *Farm Crops 20,	Seminar	
Choice { *Soils 18,	Seminar	
		18
Electives will be selected from the list on page 147	0	to 2
		—
	Total semester hours	18 to 20

* The class of 1912 will take Horticulture 4, and Botany 24, instead of Horticulture 8, and Animal Husbandry 21.

* These courses must be continued through the year. First standing will not be certified to recorder until the close of the eighth semester.

EIGHTH SEMESTER

		Required Semester Hours
Choice { Farm Crops 15,	Thesis	3
Choice { Farm Crops 16,	Thesis	5
Choice { Soils 11,	Thesis	3
Choice { Soils 12,	Thesis	5
Choice { *Farm Crops 20,	Seminar	1
Choice { *Soils 18,	Seminar	1
Agricultural Journalism 2,	Advanced Journalism	1
or 4,	Newspaper Management	1
Botany 66,	Vegetable Pathology	2 $\frac{2}{3}$
History 19,	History of Political Parties	2
		2
		9 $\frac{2}{3}$
		11 $\frac{2}{3}$
Electives will be selected from the list on page 147,	6 $\frac{1}{3}$	to 10 $\frac{1}{3}$
		—
	Total semester hours	16 to 20

* A continuation of the work in the fifth semester. Standing will be for seventh and eighth semester. One hour credit for both semesters' work will be recorded at end of eighth semester.

COURSES IN FARM CROPS

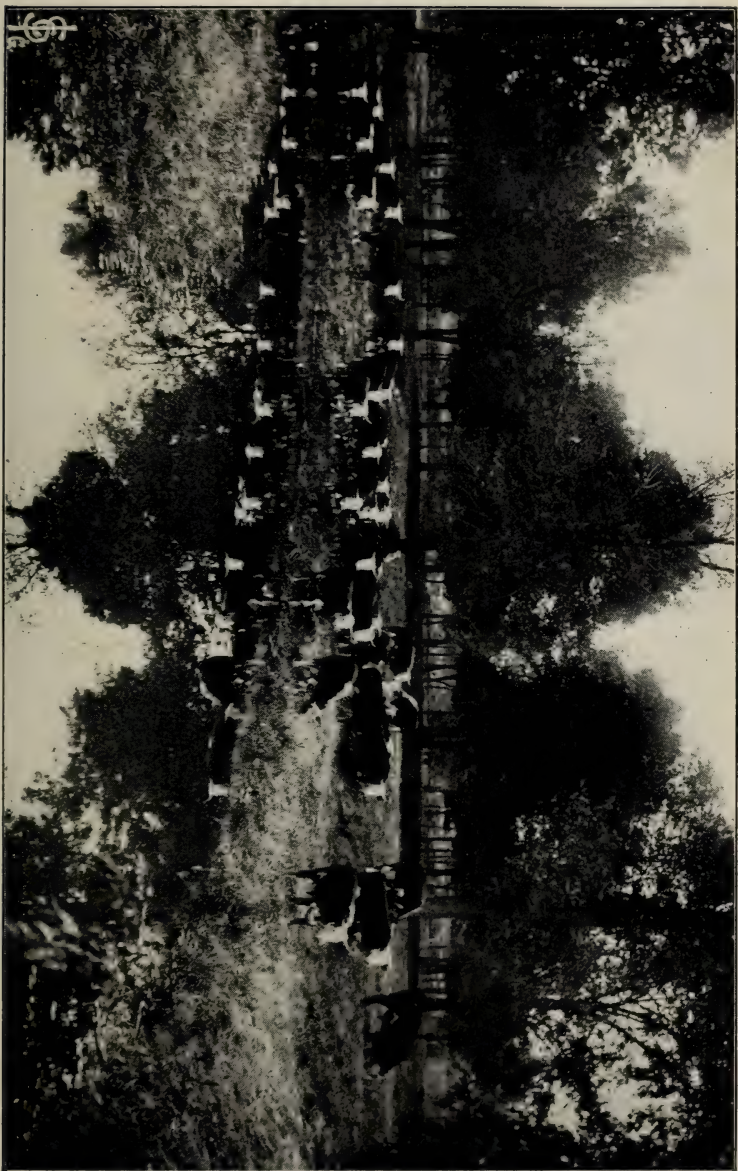
1. **Corn Growing and Judging.** Instructions in the principles and requirements of the growth of the corn plant, methods of selecting, storing, testing, grading, planting, cultivating and harvesting. The cost of production and use of the crop are taken up in detail, and the requirements of the commercial marketing of corn are studied. Each division of this subject is studied from first hand knowledge, students being required to make excursions of observation to farms, factories, and markets. A part of the semester is spent in studying corn in the field with reference to per cent stand, barren stalks and suckers; leaf surface is measured and computed, and correlation of the parts of the stalk is made. Each student is required to make a record of his own plot, husk it, and select the seed ears and hang them up for storage and shrinkage test. A detailed study is made of the botanical structure of the cornstalk, ear, and kernel according to a definitely outlined syllabus. The corn judging is limited entirely to score card practice, the student being urged to use a sample of home-grown corn. Two and two-thirds hours' credit. Recitations, two hours, and laboratory, two hours, per week. Fee, \$1.50.

2. **Small Grains.** The following small grains: Oats, wheat (winter and spring), barley, rye, emmer and speltz, and macaroni wheat; their adaptation to soils and climate, preparation of seed bed, methods of seeding, botanical structure, problems of germination and plant growth; also score card practice and the principles of commercial grading in small grains. Two and two-thirds hours' credit. Recitations, two hours, and laboratory, two hours, per week. Fee, \$1.50.

3. **Corn and Small Grain Judging.** Practice in judging corn and small grains. Under conditions identical to those found in show rooms, the student receives a training which makes him an excellent judge of quality in these grain seeds. He studies variety and breed characteristics, giving special attention to the strong and weak points of each. Prerequisite, Farm Crops 1 and 2. Two lecture and laboratory periods per week. Two hours' credit. Fee \$2.00.

4. **Corn and Small Grain Breeding.** The origin of corn and small grains. The characteristics of the leading varieties of corn are studied, and the adaptation of these varieties to the varying soil and climatic conditions of the state. Principles of improvement and breeding are investigated. The breeding blocks in the station fields are visited and a special study of the variations and correlation of characters in the strains of corn being isolated, is made. Methods employed in the breeding of corn and small grains by prominent commercial corn breeders are made a special feature in this course. Prerequisite, Farm Crops 1 and 2, Horticulture 4, Botany 24. One lecture and one laboratory period per week. One and two-thirds hours' credit. Fee, \$2.00

8. **Farm Management.** This course includes the study of the principles underlying farm management. Typical illustrations of the



Pasture Scene on the College Farm

differing phases of specialized farming and of general farming are studied; problems of labor, fencing and marketing are considered, and methods employed by successful farmers are presented. A practical and thorough study of a system of farm accounts is a special feature of this course. Actual field study of the laying out and conducting of farms is made, and special exercises in planning of rotations, field locations, and placing of buildings, form an important part of this course. Three hours' credit. Two lectures and one lecture and laboratory per week. Fee, \$2.00.

9. **Research in Farm Crops.** Individual investigation of special problems relating to cereal, forage, and root crops. Experiments are conducted in both field and greenhouse. Investigations are made as to the effect of differing conditions of storage on vitality of seed, and the effect of different stages of maturity on vitality of seed of the different crops. Variations in physical structure of crops and investigation of reasons for, and importance of such variations; methods of reproduction of the several crops and also circumstances influencing the reproduction of these crops, are investigated. Prerequisite, Farm Crops 1 and 2. Two hours' credit. Laboratory, six hours per week. Fee, \$2.00.

10. **Advanced Research in Farm Crops.** Advanced research into the problems of crop production and breeding of farm crops. The new and well equipped Farm Crops Research Laboratory furnishes opportunity for investigation leading up to thesis work. Prerequisite, Farm Crops 9. Laboratory, six hours per week. Two hours' credit. Fee, \$3.00.

11. **Advanced Study of Corn.** A deeper study of the principles underlying the breeding of corn. It aims at putting the student in possession of the latest scientific knowledge of corn breeding. A thorough study of the leading varieties of corn growing in the state is made. Prerequisite, Farm Crops 3. Lecture, one hour per week. One hour credit. Fee, \$3.00

12. **Advanced Study of Small Grains.** A special study of the principles of plant breeding, as they are revealed by the breeding of small grains, is made. The evolution of plant breeding is studied. Special attention is given to experiment station methods and accomplishments in this line of work. The object of the course is to put the student in possession of the scientific facts and principles underlying this work, as well as to give him working knowledge of scientific methods for the pursuit of such investigation. Grain judging is a special feature of this course. It is intended to fit the student for expert judging at fairs and expositions, and also to give him practical knowledge of grain, which he may use in the position of small grain specialist at grain centers. Prerequisite, Farm Crops 4. One lecture and one laboratory period per week. One and two-third hours' credit. Fee, \$3.00

15. **Thesis.** This investigation must be pursued upon some subject requiring original work. Three hours' credit.

16. **Thesis.** Same as above, excepting that it is five hours' credit.

17. **Grasses, Forage and Fiber Crops.** An exhaustive study will be made of the several grasses grown in the corn belt. This study will include an investigation into their composition, habits of growth, adaptability to various types of soils and climatic conditions, and methods of seeding and handling. Such forage and fiber crops as have been grown in Iowa, and others that could be profitably introduced, will be given study similar to the above. Special attention will be given to the growth and breeding of alfalfa, clover and timothy. Two hours' credit. Lecture, one hour. Laboratory, three hours per week. Fee, \$2.00.

18. **Summer Course in Farm Crops.** Small grains, grasses and clovers; habits of early growth, structure, rate of growth, reproduction, variations, correlations, effects of different methods of planting. Also Experiment Station Methods, nature of an ideal experimental field maintaining fertility on such a field, layout of test plots, desirable area of plots, variety testing, crop handling, record keeping and interpretation, cereal breeding, planting methods, note-taking, selection, hybridization, increasing and distributing valuable strains produced, and experimental methods adopted by leading experiment stations. Five hours' credit. Laboratory, three consecutive weeks, beginning immediately after commencement. Fee, \$5.00.

19. **Farm Crops Seminar.** The Juniors and Seniors in Farm Crops and Soils hold a joint seminar once each two weeks while college is in session. At each meeting papers prepared by students are presented and topics of special interest to Agronomy students are discussed. One hour credit.

20. **Farm Crops Seminar.** Continuation of Course 19. One hour credit.

21. **Special Advanced Judging.** A thorough training in the judging of corn and small grains. Use will be made of the various score cards until the student's judgment is well developed and comparative values of various characteristics are well established. The greater part of the time will be devoted to the judging of corn, but sufficient time will be given to the small grains, oats, wheat and barley, to fit the student for expert judging at fairs, corn shows, institutes, etc. Open to all students who have had Farm Crops 1 and 2. Laboratory four hours per week. One and one-third hours' credit. Fee, \$3.00.

COURSES IN SOILS

1. **Soil Physics.** A study of the origin, formation and classification of soils; soil moisture and methods of conserving it; the principles which underlie dry farming; soil temperature, and conditions influencing it; soil texture as affecting heat, moisture and plant food; surface tension, capillarity, osmosis, and diffusion as affecting soil conditions; the effect upon the soil and the crop of plowing, harrowing, cultivating, cropping, and rolling; washing of soils and methods of preventing the same; preparation of seed beds; cultivation and drainage as affecting moisture, temperature,



A Scene on the Horticultural Grounds

root development and the supply of available plant food. The work also comprises the determination of the specific gravity, apparent specific gravity, volume weight, porosity, water-holding capacity, and capillary power of various soils; also a study of the effect of mulches on the evaporation of water from the soil and the physical effects upon the soil of different systems of rotation and of continuous cropping. Prerequisite, Physics 205. Four hours' credit. Two lectures and two lecture and laboratory periods per week. Deposit \$4.00.

2. **Soil Fertility.** Maintenance of fertility, fertilizers and rotations; the influence of commercial fertilizers, barn-yard manure, and green manure upon the quality and yield of various crops; the effect of different crops upon the fertility of the soil and upon succeeding crops; different systems of rotation and the effect upon the productiveness of the soil of various methods of soil management; also a study of the storing, preserving, and application of farm-yard manure. This work is supplemented by a study of manures, fertilizers and soils; their composition and agricultural value. Pot and field experiments are conducted to show the influence of fertilizers, applied to the soil in different quantities and at different times, upon the quality and yield of various crops. Special attention is given to leguminous crops as fertilizers and their place in crop rotation. A study is made of special types of soil which are found in different sections of the state, such as clay, gumbo, loess, and peat, with special reference to the best methods of handling and cropping these soils. Prerequisites, Soils 1, and Chemistry 25. Four hours' credit. Two lectures and two lecture and laboratory periods per week. Deposit, \$8.00.

3. **Research Work in Soil Physics.** Experimentation and study of special problems relating to the physical characteristics of soils and their relation to crop production. Experiments may be carried on in the laboratory, greenhouse, or field. Modern laboratory and greenhouse facilities offer to the student an excellent opportunity for research work from the standpoint of Soil Physics. A wide range of special subjects is afforded the student. This course offers special advantages for a study of the physical composition of soils. Prerequisite, Soils 1. Two hours' credit. Laboratory, six hours per week. Deposit, \$5.00.

4. **Research Work in Soil Fertility.** Experimentation and study of special problems relating to maintaining and increasing the productive capacity of soils. This course is designed to enable the student to study one or more types of soil in which he may be especially interested, and also to study the effect of certain systems of soil management upon the plant food content and productive capacity of soils. This course offers special advantages for pot culture investigations and for a study of the chemical composition of soils. Prerequisites, Soils 1 and 2. Two hours' credit. Laboratory, six hours per week. Deposit, \$5.00.

6. **Advanced Soil Fertility.** A study of the plant food content and productiveness of particular types or classes of soils; the relation of the

plant and soil, such as the influence of acidity and alkalinity, and also the influence of root excretions and of organic materials; the effect of fertilizing materials upon the growth, yield and quality of various crops as determined by pot culture and field experiments; methods of conducting fertility investigations and presenting data. Lectures will be given and the students will make a careful study of the fertility investigations which have been made by the Experiment Stations of this and other countries. Special emphasis will be placed upon the data from these investigations which tend to establish practical systems of soil management. This course is also intended for the student who desires to study the methods of experimentation which are employed by leading investigators along soil fertility lines. Prerequisites, Soils 1 and 2. Two hours' credit. Two lectures per week. Fee for mimeograph, \$1.00.

7. **Investigation of Special Soils.** A study of the soil investigations which have been made at the Rothamsted Experiment Station with special reference to the effect of different systems of soil management upon the productive capacity of the soil. This course affords the student an opportunity to study and discuss the great mass of data which has been collected during a period of more than half a century at the most famous experiment station in the world. Prerequisites, Soils 1 and 2. One hour credit. Lectures and recitations, one hour per week. Fee for mimeograph notes, \$1.00.

8. **Soil Bacteriology.** Soil Bacteria and their activities in their natural habitat and a preliminary consideration of the influence which they exert on soil fertility. The work involves purely quantitative bacteriological examinations of different soil types followed by both qualitative and quantitative determinations of the various processes induced by their bacterial floras including ammonification, nitrification, denitrification, symbiotic and non-symbiotic nitrogen fixation, ammonia and nitrate-nitrogen transformation, cellulose fermentation, urea fermentation, etc. Organisms are isolated from each of the various groups and examined culturally, morphologically and physiologically. Especial attention is devoted to comparisons of the methods available for the bacteriological and chemical technique involved and to the interpretation of results. Prerequisites, Chemistry 26 and Bacteriology 1. Two lectures and three laboratory periods per week. Four hours' credit. Deposit, \$8.00.

11. **Thesis.** Must be upon some subject requiring original investigation in Soils. Three hours' credit.

12. **Thesis.** Same as Soils 11, except that it is five hours' credit.

13. **Soil Surveying and Mapping.** This course includes a further study of the physical properties of Soils and their physical composition as determined by mechanical analysis. The preparation of large scale plane table maps of selected areas and a detailed survey of the soils. Also a study of the relation of topography and the physical and chemical composition of soils to the character and growth of the native vegetation. The principles underlying the adaptability of particular soils to different



A College Greenhouse

kinds of forest and fruit trees, and to various farm and garden crops. Prerequisite, Soils 1. One and two-thirds hours' credit. Lectures and recitations, one hour, and laboratory, two hours per week. Fee, \$2.00

14. **Advanced Soil Bacteriology.** A continuation of the work given in Soils 8, involving a further consideration of the influence of bacterial activities on Soil Fertility. Special problems are studied by means of laboratory and greenhouse experiments dealing with the fixation of atmospheric nitrogen; the transformation of nitrogenous carbonaceous, and mineral compounds in the soil; the effect of manurial and fertilizer treatment on the various bacterial activities; the adequacy of the bacteriological methods now employed in indicating the crop-producing power of soils. Prerequisite, Soils 8. Lecture or reports on assigned reading, one hour, laboratory six hours, per week. Three hours' credit. Deposit, \$8.00.

15. **Advanced Laboratory Work in Soil Physics.** A study of the physical composition of soils by mechanical analysis and petrological examination; the determination of the temperature, moisture, and soluble salt content of various soils under field conditions, including methods of testing for alkali soils. Greenhouse, laboratory and field experiments are conducted to determine the effect upon soil conditions of different methods of soil management; the work also includes assigned readings, study of results of previous investigations, and written reports of results of experiments and investigations made by the student. Prerequisite, Soils 1. Two hours' credit. Laboratory, six hours per week. Deposit, \$4.00.

16. **Advanced Laboratory Work in Soil Fertility.** A detailed study of the chemical composition of soils, the analysis of typical soils of the state, or any particular locality, with special reference to the determination of humus, nitrogen, phosphorus, potassium and lime. Physiological soil analysis by the paraffin wire basket method and larger pot cultures, and by growing of plants in aqueous extracts of soils. The work also includes assigned readings, study of results of previous investigations, and written reports of results of experiments and investigations made by the student. Prerequisite, Soils 2. Two hours' credit. Laboratory, six hours per week. Deposit, \$5.00.

17. **Soils Seminar.** One hour credit. The Juniors and Seniors in Soils and Farm Crops hold a joint seminar each two weeks while college is in session. At each meeting papers, prepared by students, are presented and topics of special interest to Agronomy students are discussed.

18. **Soils Seminar.** A continuation of Course 17. One hour credit.

Department of Dairying

MARTIN MORTENSEN, PROFESSOR

WALTER HOWARD COOPER, ASSISTANT PROFESSOR

JOHN HAROLD GORDON, ASSISTANT PROFESSOR IN DAIRY BACTERIOLOGY

HARRY JOHN EVANS, INSTRUCTOR

PAUL W. CROWLEY, INSTRUCTOR

HAROLD FREDERICK LUICK, EXTENSION WORK

Owing to the rapid progress and the application of scientific principles to the dairy industry, it is necessary that those engaged in this work should keep in touch with new ideas and principles. In order to meet this demand, the dairy department offers a four-year course for qualifying students to become competent teachers and investigators of dairying in agricultural colleges and experiment stations, inspectors of dairy products and creameries in municipal, state and government service, or superintendents of large creameries or dairy farms.

The Dairy Department offers unexcelled facilities for teaching dairying in a thoroughly practical and scientific manner. The dairy farm of 200 acres is well stocked with various types and breeds of milk cows. The milk from this herd, together with the milk and cream shipped and hauled to the college, supplies all the needs of the creamery.

The Dairy Building erected at a cost of about \$75,000 is a practical working creamery, and cheese and ice-cream factory, and is considered by authorities to be one of the most practical and complete dairy buildings in existence.

COURSE IN DAIRYING

For Freshman year, see Agricultural Course, page 77.

Sophomore Year

THIRD SEMESTER

		Required Semester Hours
Agricultural Engineering 7,	Dairy Engineering	1½
Animal Husbandry 3,	Breed Types of Cattle and Sheep	3½
Agricultural Chemistry 25,	Organic Chemistry	3½
Economic Science 9,	Outlines of Economics	3
English 11,	Exposition	3
History 19,	History of Political Parties	2
Public Speaking 10,	Extempore Speech	2
Military 3, or Athletics		—
Total semester hours		18½

FOURTH SEMESTER

		Required Semester Hours
Dairying 11,	Cheese Making	3
Dairying 13,	Milk Testing and Milk Inspection	1 $\frac{2}{3}$
Animal Husbandry 4,	Breed Types of Dairy Cattle,	
	Horses and Swine	3 $\frac{1}{3}$
Agricultural Chemistry 26,	Agricultural Analysis	3 $\frac{1}{3}$
Choice {	Economic Science 10,	3
	History 6,	
	Europe in the XIX Century	
English 10,	Narration and Description	3
Public Speaking 11,	Extempore Speech	2
Military 4, or Athletics		R
Total semester hours		19 $\frac{1}{3}$

Junior Year

FIFTH SEMESTER

		Required Semester Hours
Dairying 26,	Judging Dairy Products	1
Dairying 14,	Advanced Butter Making	3 $\frac{1}{3}$
Agricultural Chemistry 40,	Dairy Chemistry	3 $\frac{1}{3}$
Animal Husbandry 21,	Principles of Breeding	2
Botany 25,	Microscopical Examination	
	of Foods	2
English 12,	Argumentation	2
Horticulture 8,	Landscape Gardening	2
		15 $\frac{2}{3}$
Electives will be selected from list on page 147.		$\frac{1}{3}$ to 4 $\frac{1}{3}$
Total semester hours		16 to 20

SIXTH SEMESTER

		Required Semester Hours
Dairying 16,	Technology of Milk	1
Dairying 24,	Fancy Cheese Making	2 $\frac{1}{3}$
Dairying 27,	Butter Judging	1
Agricultural Chemistry 65,	Advanced Dairy Chemistry	3 $\frac{1}{3}$
Bacteriology 1,	General Bacteriology	4
		11 $\frac{2}{3}$
Electives will be selected from list on page 147		4 $\frac{1}{3}$ to 8 $\frac{1}{3}$
Total semester hours		16 to 20

Senior Year**SEVENTH SEMESTER**Required
Semester Hours

Dairying 17,	Dairy Bacteriology	4
Dairying 19,	Seminar Work	2
Dairying 28,	Advanced Butter Judging	1
Agricultural Journalism 1,	Beginning Journalism	1
Animal Husbandry 20,	Animal Feeding	2
Veterinary 19,	Obstetrics	1
Veterinary 44,	Sanitary Science	2
		—
		13
Electives will be selected from list on page 147.	3 to 7	—
		—
	Total semester hours 16 to 20	

EIGHTH SEMESTERRequired
Semester Hours

Dairying 20,	Factory Management	3½
Dairying 21,	Preparation of Ice Cream and Ices	1½
Dairying 23,	Thesis	2
Animal Husbandry 15,	Milk Production	1
Agricultural Journalism 2 or 4,	Advanced Journalism or Newspaper Management	1
		—
		9
Electives will be selected from list on page 147.	7 to 11	—
		—
	Total semester hours 16 to 20	

COURSES IN DAIRYING

10. **Domestic Dairying.** Study of those dairy subjects that interest the housekeeper and dietetist. The important topics are: The nutritive and economic value of milk; its dietetics and hygiene; market milk, infants' milk, invalids' milk, cream, ice cream, condensed milk, milk chocolates, malted milk, dried milk, fermented milks (Kephir, Koumissete), buttermilk, butter, and cheese. Demonstrations are given in types of butter and cheese and in testing the purity of milk and butter. Two lectures per week. Fee, \$2.00.

11. **Cheesemaking.** A study of the importance of the quality and composition of milk in the manufacture of Cheddar cheese; the principles involved in cutting, heating, milling, salting and pressing the curd, curing



Testing Steam and Gasoline Engines

and marketing; influence of organized and unorganized ferments in cheese; and the construction and ventilation of cheese curing rooms. Three hours' credit. Recitation, one hour and laboratory, six hours, per week. Fee, \$3.00.

12. **Farm Dairying.** Includes a general study of the secretion, composition, testing, separation and acidity of milk, preparation of starters, ripening of cream, and churning and packing butter. Two and two-thirds hours' credit. Recitation, two hours, and laboratory two hours, per week. Fee, \$3.00.

13. **Milk Testing and Milk Inspection.** A study of the Babcock test, Farrington's and Manns' test for determining acidity, the use of the lactometer for detecting adulteration, composite sampling, and testing of individual cows, and detection of different preservatives and adulterations. One and two-thirds hours' credit. Recitation, one hour, and laboratory, two hours, per week. Fee, \$2.50.

14. **Advanced Buttermaking.** A study of the physical and chemical properties, secretion and composition; separation of milk, cream ripening, the principles of churning, packing and marketing butter. Prerequisite, Agricultural Chemistry 21. Three and one-third hours' credit. Recitations, two hours, and laboratory, four hours, per week. Fee, \$3.00.

16. **Technology of Milk.** A study of the utilization of milk and its products, as the preparation of condensed, modified, and milk sugar, casein, and the food value of milk and its products. Prerequisite, Agricultural Chemistry 25. Recitation, one hour per week. Fee, 50 cents.

17. **Dairy Bacteriology.** A study of bacteria in milk and its products; their sources, mode of entry and subsequent changes produced; the production and handling of milk from a hygienic and economic viewpoint and its relation to the public health. Prerequisites, Bacteriology 1 or 15, and Chemistry 26. Four hours' credit. Lectures two hours, and laboratory, six hours, per week. Fee, \$4.00.

19. **Seminar Work.** A study of various authorities on Dairying together with the work of the experiment stations on this subject. Prerequisites, Bacteriology 1, Dairying 11 and 14. A knowledge of French and German is recommended. Two hours per week.

20. **Factory Management.** Consists of the location, organization, construction, drainage, and ventilation of factories, the treatment of the by-products, and creamery refrigeration, thus qualifying a student to superintend or manage a large factory or dairy establishment. It is advisable for students to put in the laboratory during vacation or when work can be done during consecutive days. Prerequisite, Dairy 14 and 28. Three and one-third hours' credit. Lecture, two hours, and laboratory, four hours, per week.

21. **Preparation of Ice-Cream and Ices.** A study of the preparation of ice-cream, sherbets, and ices, made on a private or commercial scale. Both lectures and laboratory. One and two-thirds hours' credit. One recitation and one two hour laboratory. Fee, \$3.00.

23. **Thesis.** Original work on some dairy subject. May be worked out in co-operation with the departments of chemistry or bacteriology. Students should consult the professor concerning their subject at the beginning of their Senior year. Two hours per week.

24. **Fancy Cheesemaking.** Includes making the varieties found in the American market as Limburger, Swiss, Brick, Roquefort, Sage, Stilton, Pineapple, Gouda, Gorgonzola, and Neufchâtel. Two and one-third hours' credit. Lecture, one hour, and laboratory, four hours, per week. Fee, \$3.00.

25. **Advanced Dairy Bacteriology.** Laboratory investigation of bacteriological problems relating to dairying, the nature of the work being adapted largely to the individual student. Prerequisite, Dairy 17. Credit, three hours.

26. **Judging Dairy Products.** Includes the judging of butter, milk and cream, ice-cream, sherbet, and the various kinds of cheeses, paying special attention to score cards. Prerequisite, Dairying 13. One hour credit. Fee, \$3.00.

27. **Butter Judging.** A study of standard market requirements. Includes more advanced work in scoring butter. Prerequisites, Dairying 14 and 26. One hour credit. Fee, \$3.00.

28. **Advanced Butter Judging.** This course is intended to qualify a student to fill the position of an official judge. One hour credit. Fee, \$3.00.

Department of Animal Husbandry

WILLARD JOHN KENNEDY, PROFESSOR

EDWARD NORRIS WENTWORTH, ASSOCIATE PROFESSOR

WILLIAM HARPER PEW, ASSOCIATE PROFESSOR

CLARE NEWTON ARNETT, ASSOCIATE PROFESSOR

MARK GEORGE THORNBURG, ASSISTANT PROFESSOR

HENRY HERBERT KILDEE, ASSISTANT PROFESSOR, SUPT. OF DAIRY FARM

WILLIAM A. LIPPINCOTT, INSTRUCTOR IN POULTRY

RALPH K. BLISS, EXTENSION WORK

ARTHUR A. BURGER, EXTENSION WORK

The department of Animal Husbandry stands for all lines of work which pertain to the judging, selecting, breeding, feeding, development, care, and management of the various breeds and classes of domesticated animals. Because of the importance of the live stock industry to the welfare of the state, and because of the demand for instruction in this line, the equipment for instruction has been made as complete in every detail as possible.

The herds and flocks, established at an early date, have been added to from time to time until our equipment in this line, consisting of almost all recognized breeds of animals, places us in a position to do work in Animal Husbandry lines which cannot be accomplished in those institutions where such specimens are not furnished for instruction. Believing that training the eye is the only way to make a young man a proficient judge of live stock, the work of the lecture room and laboratory is demonstrated by the use of living specimens.

The two commodious judging pavilions, located near the barn, afford ample room for dividing the classes into many sections, thus allowing individual work.

An excellent collection of horses representing all the market classes and the breeds of both light and heavy types is maintained for instruction purposes. Among these are good representatives of the Shires, Percherons, Clydesdales, French Coachers, Hackneys, Standard breeds, and American Saddle Horses. Some of the horses are imported; while the others have been purchased, with much care in their selection, from the best breeders on the continent.

More than 200 head of cattle, representing all the leading beef, dual-purpose, and dairy breeds are maintained on the farm. Complete breeding herds of most of the breeds are kept. An excellent collection of steers, representing the highest type of fat steer, and all the other classes and grades to be found in our leading markets down to the very lowest grades, is always available for class work. This affords our students an excellent opportunity to study the market demands and to know what constitutes each class, also why there is such a wide margin in the prices paid for cattle by the packer.

The dairy farm is well stocked with dairy cattle, including a herd of about a hundred representatives of the Holsteins, Jerseys, Guernseys, Ayrshires, milking Short-horns, with good sires of the different breeds. This equipment affords an excellent opportunity for class work when studying the origin, history, and development of the different breeds of dairy cattle, their characteristics and the conditions under which they are evolved; also for carrying on investigations along the lines of breeding, feeding and management of the dairy herd for profit; and the relative values of home-grown feedstuffs and by-products in the production of milk and butter fat.

The flock of sheep, consisting of over 200 head of seven different breeds, have been carefully selected to represent the type and characteristic of each breed, both in regard to form and wool-bearing qualities. In addition to the breeding flocks, the department has a choice collection of fat wethers which affords an opportunity for the student to familiarize himself with the highest type of finished mutton sheep. All these are available for class work.

In the swine department, representatives of six breeds of the best American and British varieties are maintained. As in the other departments, the aim in this has been to keep in touch with the modern ideas of

leading breeders, both in regard to breeding and the type of the animals in these breeds.

At all seasons of the year there is more or less feeding of market stock being done on the farm and in connection with the Experiment Station, so that excellent material is always available for instruction purposes regarding the qualities that add to the value of stock for the ordinary market. Having pure-bred representatives, it is easy to inform the student in a practical way on the finer points of color, type, and other characteristics that relate to the pure-bred classes of stock.

To assist further in this work, the herd books of the different American and foreign registry associations are being constantly added to the library. The College possesses the most complete set of the English Short-horn herd books in existence in America. Through herd book study, the student is enabled not only to inform himself in regard to pedigrees, but he is enabled also to study the different scales of points which the breeders have adopted to represent the highest types of the various breeds.

The department is also equipped with photographs, charts, and lantern slides which are used in the lecture room when it is impossible to illustrate with the living animal. The abundant material available from the herds and flocks is used extensively in all lectures and score card practice. By means of score cards prepared by the department, the students are brought in close contact with the animals, and through them are informed on the points of market merit desirable in ordinary stock, while later the use of the official scale or points for the different breeds in a similar way makes them skillful in judging representatives of different breeds.

As soon as the student is familiar with the use of the score card, comparative judging is introduced. In comparative judging from four to six animals are used, and each student is required to place all the animals in order of merit, and write down clearly and concisely on a blank folder, prepared especially for this work, full reasons for making his awards. This kind of work teaches the student to compare animals and to balance the weak and the strong points of each in making his final awards. As soon as the student demonstrates his ability to place classes well, herd groups and sweepstake classes are introduced during his Senior year's work. This kind of work is similar to the most difficult judging done at our leading state fairs and international expositions. As soon as the student shows that he possesses the qualifications needed to judge stock in the show ring, he is sent out, in answer to the many requests from the secretaries, to judge various classes of stock at county fairs. This, in connection with his college work, results in establishing the lessons learned in the class room.

Positions Open for Men Trained Along Animal Husbandry Lines

There is a great demand for competent young men trained along the lines of practical and scientific Animal Husbandry work, men who

combine their college training with practical experience and native ability. Such is the training offered to the young men in this course. The demand for such students is unlimited at a compensation not exceeded in any other calling. A few of the many lines of work open to graduates of this department are: College and experiment station work, agricultural journalism, managers of stock farms, salesmen with commission merchants, buyers for the packing houses at the many stockyard centers, and salesmen of animal feedstuffs manufactured by the packing houses, glucose companies, linseed and cottonseed oil companies.

POULTRY HUSBANDRY

The Poultry Husbandry Department affords opportunities for instruction in all lines of poultry work, such as the selection, care and management, incubating, brooding, judging, breeding, feeding, showing, marketing and diseases of various varieties of fowls, ducks, turkeys and geese.

The Poultry Farm of nearly twenty acres, upon which the buildings have been erected during the last two years, offers unexcelled opportunities for practical instruction. The buildings consist of a large headquarters building, long poultry house, and many colony houses for brooders, young stock, breeding stock, and fattening stock. The Headquarters Building contains a large feed room, carpenter shop, incubator room, killing and marketing room, egg room, and room for attendants; and is without doubt the best building of its kind in the country. The long poultry house, used in laboratory and investigation work, is of the cloth curtain type, and consists of seven 12x12 pens which, together with the colony houses, have a capacity of approximately 1,000 head of poultry. All pens are equipped with trap nests so that individual egg records may be obtained from each hen. The Incubator Room is equipped with machines made by several of the leading incubator firms and affords opportunity for a complete study of the different types of incubators. A thorough study of the latest brooding methods is also made.

Positions Open to Men Trained Along Poultry Husbandry Lines

At the present time there is an urgent and increasing demand for college men who possess scientific training in Poultry Husbandry, together with practical experience and ability. Some of the openings for students trained along these lines are government, college and experiment station work, managers of utility and fancy poultry farms, poultry journalism and poultry judging, managers of poultry supply houses and poultry fattening establishments, and salesmen with the incubator and brooder manufacturers.

COURSE IN ANIMAL HUSBANDRY

For Freshman year, see Agricultural Course, page 77.

Sophomore Year

THIRD SEMESTER

		Required Semester Hours
Animal Husbandry 3,	Breed Types of Cattle and Sheep	3½
*Agricultural Chemistry 25,	Organic Chemistry	3½
Agricultural Engineering 4,	Farm Engineering	3½
*English 11,	Exposition	3
Zoology 20,	General Zoology	4½
Military 3, or Athletics		R
		—
	Total semester hours	17½

* Class of 1914 will take Agricultural Chemistry 21 instead of 25, and English 12 instead of 11.

FOURTH SEMESTER

		Required Semester Hours
Animal Husbandry 4,	Breed Types of Dairy Cattle, Horses and Swine	3½
*Agricultural Chemistry 26,	Agricultural Analysis	3½
Agricultural Engineering 5,	Farm Machinery and Farm Motors	2½
Botany 26,	Ecology	1½
*English 10,	Narration and Description	3
Zoology 21,	General Zoology	4½
Military 4, or Athletics		R
		—
	Total semester hours	18½

* Class of 1914 will take Agricultural Chemistry 23 instead of 26, and English 10.

Junior Year

FIFTH SEMESTER

		Required Semester Hours
Animal Husbandry 11,	Feeding and Management of Live Stock	2
*Animal Husbandry 22,	Seminar	
Animal Husbandry 31,	Poultry Management	2½
Bacteriology 15,	General Bacteriology	2½
English 12,	Argumentation	2

* This course must be continued through the year. Final standing will not be certified to recorder until the close of the sixth semester.

*History 19,	History of Political Parties	2
Soils 1,	Soil Physics	4
Zoology 19,	Embryology	2 $\frac{2}{3}$

—
18

Electives will be selected from the list on page 147 0 to 2

Total semester hours 18 to 20

* Class of 1914 will take Agricultural Chemistry 25 instead of History 19 and English 12.

SIXTH SEMESTER

Required
Semester Hours

Animal Husbandry 8,	Animal Breeding	2
Animal Husbandry 12,	Feeding and Management of Live Stock	2
*Animal Husbandry 22,	Seminar	1
Animal Husbandry 37,	Poultry Management	2 $\frac{2}{3}$
Soils 2,	Soil Fertility	4
**Veterinary 23,	Comparative Physiology	2
Zoology 8,	Animal Parasites	2

—
15 $\frac{2}{3}$ Electives will be selected from the list on page 147 $\frac{1}{3}$ to 4 $\frac{1}{3}$

Total semester hours 16 to 20

* A continuation of work in fifth semester. Standing will be for fifth and sixth semester. One hour credit for both semesters' work will be recorded at end of sixth semester.

** Classes of 1913 and 1914 will take Agricultural Chemistry 26 instead of Veterinary 23.

Senior Year

SEVENTH SEMESTER

Required
Semester Hours

Animal Husbandry 6,	Advanced Live Stock Judging	1 $\frac{1}{3}$
Animal Husbandry 9,	Animal Nutrition and Packing House By-Products	2
*Animal Husbandry 23,	Seminar	
Horticulture 8,	Landscape Gardening	2
Soils 6,	Advanced Fertility	2
Veterinary 19,	Obstetrics	1

* This course must be continued through the year. Final standing will not be certified to the recorder until close of the eighth semester.

Veterinary 44,	Sanitary Science	2
Veterinary 55,	Anatomy of Domestic Animals	1½
		—
		11⅔
Electives will be selected from the list on page 147.	4⅓ to	8⅓
		—
	Total semester hours	16 to 20

EIGHTH SEMESTER

		Required Semester Hours
Animal Husbandry 7,	Herd Book Study	2
Animal Husbandry 10,	Thesis	2
Animal Husbandry 13,	Advanced Work in Beef Pro- duction	1
Animal Husbandry 14,	Advanced Work in Pork Pro- duction	1
Animal Husbandry 15,	Milk Production	1
Animal Husbandry 16,	Advanced Work in Mutton and Wool Production	1
Animal Husbandry 17,	Advanced Work in Horse Feed- ing	1
Animal Husbandry 23,	Seminar	1
A continuation of work in the seventh semester. Stand- ing will be for seventh and eighth semesters. One hour credit for both semesters' work will be recorded at close of eighth semester.		
Veterinary 17,	Soundness and Shoeing	2
Zoology 6,	Evolution of Animals	1
		—
		13
Electives will be selected from the list on page 147	3 to	7
		—
	Total semester hours	16 to 20

POULTRY HUSBANDRY GROUP

For Sophomore and Junior years see Animal Husbandry Course.

Senior Year

SEVENTH SEMESTER

		Required Semester Hours
Animal Husbandry 9,	Animal Nutrition	2
Animal Husbandry 30,	Poultry Judging	2⅓

Animal Husbandry 32,	Practice in Poultry Feeding and Management	1
Animal Husbandry 35,	Poultry Research and Experimentation	1
Animal Husbandry 38,	Practice in Poultry Fattening	1
*Animal Husbandry 40,	Poultry Seminar	
Agricultural Journalism 1,		1
Bacteriology 1,	General Bacteriology	4
Veterinary 44,	Sanitary Science	2
Economics 9,	Outlines of Economics	3

 17 $\frac{2}{3}$

Electives will be selected from the list on page 147 0 to 2 $\frac{1}{3}$

Total semester hours 17 $\frac{2}{3}$ to 20

* Course 40 continues throughout the year. Credit is given at the close of the Eighth Semester.

EIGHTH SEMESTER

		Required Semester Hours
Animal Husbandry 10,	Thesis	2
Animal Husbandry 33,	Incubator Practice	1
Animal Husbandry 34,	Brooder Practice	1
Animal Husbandry 36,	Poultry Research and Experimentation	1
Animal Husbandry 39,	Advanced Poultry Judging	1
Animal Husbandry 40,	Poultry Seminar	1
Animal Husbandry 41,	Anatomy and Physiology of Poultry	2
Animal Husbandry 42,	Marketing Poultry Products	2
Veterinary 18,	Conformation and Soundness	2
Zoology 6,	Evolution of Animals	1
Agricultural Journalism 2,		1

 15

Electives will be selected from the list on page 147 1 to 5

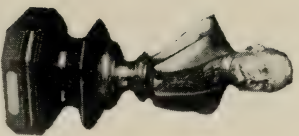
Total semester hours 16 to 20

COURSES IN ANIMAL HUSBANDRY

1. **Market Types of Cattle and Sheep.** Includes the judging of different market classes of cattle, both beef and dual-purpose, and sheep, both mutton and wool. Credit, two hours. Three hours' laboratory and one hour lecture per week. Fee, \$2.00.

2. **Market Types of Dairy Cattle, Horses and Swine.** Includes judging different market classes of dairy cattle, light and heavy horses,

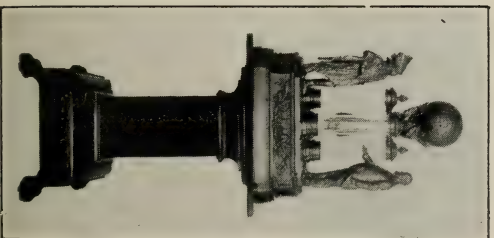
- and swine, (bacon and fat). Three hours' laboratory and one hour lecture per week. Two hours' credit. Fee, \$2.00.
3. **Breed Types of Cattle and Sheep.** Includes judging representatives of different breeds according to their official standards, a study of their origin, history, characteristics, and adaptability to different conditions of climate and soil. Prerequisite, Animal Husbandry 1. Three and one-third hours' credit. Lectures, two hours and two 2-hour judging periods per week. Fee, \$2.00.
4. **Breed Types of Dairy Cattle, Horses and Swine.** Includes judging of representatives of different breeds according to their official standards, a study of their origin, history, characteristics, and adaptability to different conditions of climate and soil. Prerequisite, Animal Husbandry 2. Three and one-third hours' credit. Lectures, two hours, and two 2-hour judging periods per week. Fee, \$2.00.
6. **Advanced Live Stock Judging.** Includes judging horses, cattle, sheep and swine, especially in groups similar to county and state fair work. Prerequisites, Animal Husbandry 4, and Zoology 3. One and one-third hours' credit. Two 2-hour judging periods per week. Fee, \$2.00.
7. **Herd Book Study.** Includes a study of herd books, with a view to becoming acquainted with the pedigrees of the leading strains and families of the different breeds of live stock. Prerequisite, Animal Husbandry 4. Recitations, two hours per week.
8. **Animal Breeding.** Embraces a study of principles of breeding, including selection, heredity, atavism, variation, fecundity, with the presentation of methods of breeding, in-and-in breeding, cross breeding, etc., and a historical study of their results, also the several features relating to the higher breeding of pure-bred stock. Prerequisites, Animal Husbandry 4, and Zoology 5. Recitations, two hours per week.
9. **Animal Nutrition and Packing House By-Products.** Study of anatomy and physiology of the digestive system, the purpose of nutrition, the theory and practical economy of rations for growth, fattening, milk or maintenance; sanitation of feeds and hygiene of the farm. Prerequisite, Chemistry 25. Recitations, two hours per week.
10. **Thesis.** Must be along some line to be arranged with the head of the department. Two hours' credit.
11. **Feeding and Management of Live Stock.** The practical feeding, care, and management of beef and dairy cattle. Two hours' credit. Lecture, one and one-third hours, and laboratory, two hours, per week. Fee, \$2.00.
12. **Feeding and Management of Live Stock.** The practical feeding, care and management of horses, hogs and sheep. Prerequisite, Animal Husbandry 11. Two hours' credit. Lecture, one and one-third hours, and laboratory, two hours, per week. Fee, \$2.00.
13. **Advanced Work in Beef Production.** A systematic study of the most successful and economical methods of producing beef cattle



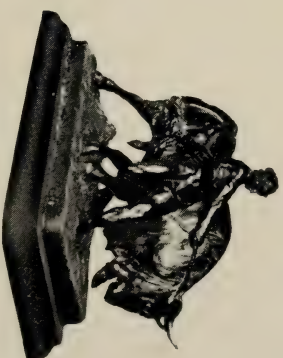
Diaz Trophy



The Spoor Cattle Trophy



The Cook Corn Trophy

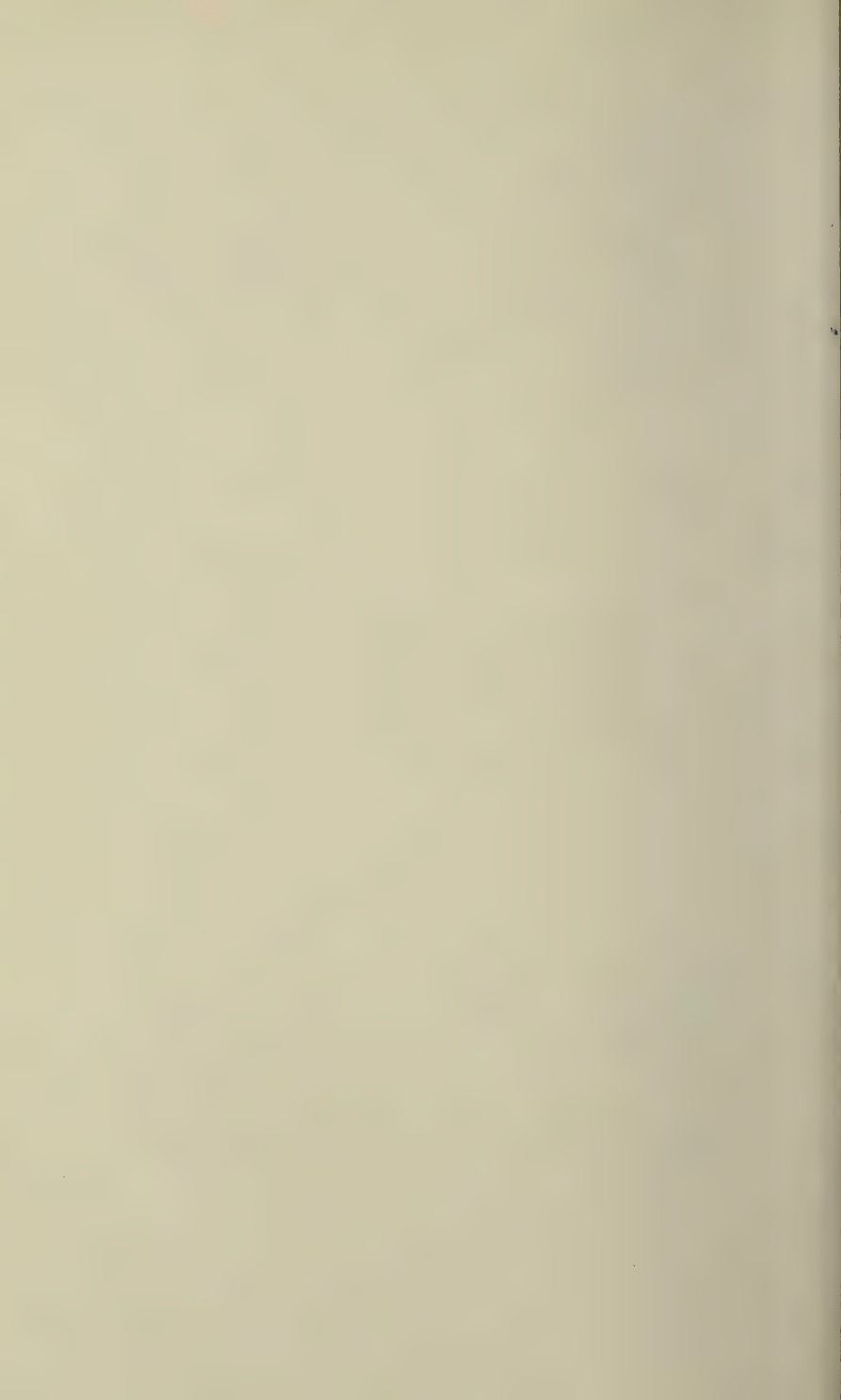


International Trophy



The Spoor Horse Trophy

INTERNATIONAL TROPHIES WON BY IOWA STATE COLLEGE STUDENTS



for market purposes; production of baby beef; advisability of long and short feeding periods; and the feeding of grain rations to cattle on grass. Prerequisites, Animal Husbandry 9, and Zoology 8. One hour credit. Five 1-hour periods per week for first five weeks.

14. **Advanced Work in Pork Production.** A systematic study of most successful and economical methods of growing and finishing pigs of both the lard and bacon types for market purposes. Prerequisites, Animal Husbandry 9, and Zoology 8. One hour credit. Five 1-hour periods per week for second five weeks.

15. **Milk Production.** Study of various feeding stuffs and the methods of preparing and feeding same as related to most successful and economical production of milk. Prerequisite, Animal Husbandry 9. One hour credit. Five 1-hour periods during four weeks, following Animal Husbandry 14.

16. **Advanced Work in Mutton and Wool Production.** A thorough study of various feeding stuffs as related to economical production of mutton and wool. Prerequisites, Animal Husbandry 9 and Zoology 8. One hour credit. Five 1-hour periods per week following Animal Husbandry 15.

17. **Advanced Work in Horse Feeding.** A study of most successful and economical methods of growing and developing young animals; most economical and satisfactory rations for horses at light, medium and heavy work; study of the feeding stuffs best adapted to the production of heavy and economical gains on horses which are being fattened for market. Prerequisites, Animal Husbandry 9, and Zoology 8. One hour credit. Five 1-hour periods per week following Animal Husbandry 16.

20. **Animal Feeding.** A study of the composition and digestibility of feeding stuffs; the preparation of coarse fodders; the grinding, steaming and cooking of feeding stuffs; feeding standards and the calculation of rations; feeding for meat, milk, wool, growth and work. Prerequisite, Chemistry 13 or 25. Two hours' credit.

21. **Principles of Breeding.** An elementary course in breeding offered to meet the demands of those students who have not sufficient foundation to take the regular course in Animal Breeding. Embraces a study of the general principles of breeding, selection, variation, heredity, atavism, etc., and a historical study of the results to date. Prerequisites, Animal Husbandry 1 and 2. Two hours' credit.

22. **Animal Husbandry Seminar.** One hour credit.

23. **Animal Husbandry Seminar.** One hour credit.

The Animal Husbandry Seminar Courses 22 and 23 meet once each two weeks while college is in session, and has for its members the professors and instructors in Animal Husbandry, and all students in the Junior and Senior classes in the course in Animal Husbandry. At each meeting, four students—two Seniors and two Juniors—present papers on associated Animal Husbandry topics. These subjects are selected a

half year in advance and follow, in regular series, Animal Breeding, Relation of Animal Husbandry to Other Industries, Animal Feeding, and a study of Live Stock Organizations, Expositions, College and Experiment Station Organization and Equipment.

COURSES IN POULTRY HUSBANDRY

30. **Poultry Judging.** This course includes a study of the origins, history, and classification of the various breeds and varieties; and the scoring, judging and breeding of the most important varieties, in accordance with the American Standard of Perfection. Practice will be given in the study of feather markings, judging and fitting of birds for show. Two and two-thirds hours' credit. Lectures, two hours, and one 2-hour laboratory period, per week. Fee, \$2.00.

31. **Poultry Management.** This includes a study of poultry houses, arrangement of buildings and yards, feeds and feeding, judging for market types, incubation, brooding, anatomy of fowl and egg diseases, sanitation, caponizing, killing, dressing and marketing of poultry products. Two and two-thirds hours' credit. Lectures, two hours, and one 2-hour laboratory period, per week. Fee, \$2.00.

32. **Practice in Poultry Feeding and Management.** The student will be given charge of a pen of fowls and will be required to keep a record of the amounts and cost of food consumed, gains made, eggs produced and calculate the profit or loss. This work will cover a period of three weeks, and the student must be present morning, noon and afternoon, time to be arranged by appointment with instructor. Prerequisite, Course 31 and 37. One hours' credit. Fee, \$2.00.

33. **Incubator Practice.** Each student will be given charge of one or more incubators for the period of one hatch and required to keep the records of fuel consumed, temperatures, infertile eggs, dead germs, dead in shell, chicks hatched, and reckon the cost of incubation. This course will cover a period of four weeks and the student must be present morning, noon and afternoon, time to be arranged by appointment with the instructor in charge. Prerequisites, Courses 31 and 37. One hour credit. Fee, \$2.00.

34. **Brooder Practice.** Each student will be given charge of chicks in a brooder for four weeks from time of hatching and must keep records of temperatures, fuel and foods consumed, gains made, mortality, and calculate the cost of brooding. The student will be required to be present morning, noon and afternoon, time to be arranged by appointment with instructor. Prerequisites, Courses 31, 33 and 37. One hour credit. Fee, \$2.00.

35 and 36. **Poultry Research and Experimentation.** This course is intended for those students who wish to fit themselves especially for college and experiment station work in Poultry Husbandry. This course will include a report of special research on some poultry topic, a study

of the Poultry Husbandry work now being carried on in the experiment stations throughout the country, methods and technique of breeding for eggs production and meat types, arrangement of experimental records and data in feeding, breeding, incubation and brooding. Students electing this course should also take their thesis in Poultry Husbandry. This course extends throughout the year. Time by appointment. Prerequisites, Courses 31 and 37. One hour credit each semester. Fee, \$2.00.

37. Poultry Management. This course continues the work started in Course 31. Two and two-thirds hours' credit. Lecture, two hours, and one 2-hour laboratory period per week. Fee, \$2.00.

38. Practice in Poultry Fattening. Each student will be given charge of and feed several lots of fattening stock, comparing different methods and rations for fattening poultry. Records must be kept showing the amounts and cost of food fed, amounts and cost of gains in weight, cost per pound of gain, and calculations made of the profit or loss on each lot of stock. This course will cover a period of three weeks and the student must be present morning and evening, time to be arranged by appointment with instructor. Prerequisites, Courses 31 and 37. One hour credit. Fee, \$2.00.

39. Advanced Poultry Judging. Practice and study in breeding and judging standard varieties of poultry and instruction in show room management. Lectures and laboratory one 2-hour period per week. Prerequisite, Course 30. One hour credit. Fee, \$2.00.

40. Poultry Seminar. The poultry seminar meets once every two weeks during the college year. Papers are presented and discussed by members on poultry management, breeding, diseases, poultry organizations, investigations of poultry farms and packing house and other current topics. This course is open only to senior and special students of the Poultry Department. Prerequisites, Courses 31 and 37. Time by arrangement. One hour credit.

41. Anatomy and Physiology of Poultry. Includes a study of the comparative anatomy and physiology of various species of poultry, special emphasis being laid upon the forms and functions of the bones, digestive, respiratory and reproductive systems of the common fowl. Lectures one hour per week and forty-eight actual hours of laboratory work near the end of the semester. Prerequisites, Courses 31 and 37, and Veterinary 56 and 23. Two hours' credit. Fee, \$2.00.

42. Marketing of Poultry Products. Includes the study of the market classifications of poultry, eggs and feathers, methods of dressing, packing, shipping and selling, requirements of different markets, poultry and egg boards, cold storage of poultry and eggs. Two lectures per week. Prerequisites, Courses 31 and 37. Two hours' credit.

ONE-YEAR POULTRY HUSBANDRY COURSE

This course is intended for those students who wish to prepare themselves for practical poultry work and have but one year to devote to

study and practice. Students taking this course must meet fully the requirements for admission to the College. The course will consist of Courses 30 to 34 and 37 to 42, inclusive, practical work on the Poultry Farm, and such work in Animal Husbandry, Horticulture or other departments as may be best adapted to each individual student. The practical work will consist of five to eight hours of work per day in the caring for poultry, building of colony houses, running incubators and brooders, killing and dressing, mixing of feeds, and such other work as is ordinarily done on a poultry farm. This gives the student a chance to acquire that skill which comes only from practice.

Department of Horticulture and Forestry

SPENCER AMBROSE BEACH, PROFESSOR

ARTHUR THOMAS ERWIN, ASSOCIATE PROFESSOR, HORTICULTURE

GILMOUR BEYERS MAC DONALD, ASSISTANT PROFESSOR, FORESTRY

FRANK WISDOM ALLEN, JR., INSTRUCTOR

THOMAS MONTGOMERY MC CALL, INSTRUCTOR

GEORGE RAYMOND BLISS, EXTENSION WORK

JOHN REARDON, GARDENER

The Department of Horticulture and Forestry, with its orchards, plantations of small fruits and vegetables, forest garden, forest area, pomological and forestal museums, greenhouses, laboratories and library, affords excellent opportunities for instruction and research.

A large part of the library of the Department is kept in its offices in the Hall of Agriculture where it is available to students specializing in this line of work. Besides a fairly complete collection of publications pertaining to horticulture and forestry and files of numerous periodicals, it also includes the complete library of Charles Downing containing his original drawings and manuscripts and many rare and valuable works on horticulture and forestry.

About 100 acres of land now available for horticultural and forestal purposes including a recently added tract of sixty acres on which orchards and forest plantations are being developed. Besides this the campus of more than 100 acres affords opportunities for instruction concerning ornamental trees and plants and landscape design.

Orchard trees ranging in age from one to more than twenty years represent the hardiest types of cultivated fruits both native and foreign and include over a thousand varieties. Several thousand seedling varieties which have been originated in the work in plant breeding are being tested in the orchards and nurseries. Various methods of stratification, layering, budding, grafting and other operations with plants are given practical

illustration in the greenhouses and nurseries. Leading types of vegetables are grown to afford opportunity for study in this line of work.

The past few years have witnessed a wonderful development in the science of Forestry due in large part to the increasing scarcity of timber so necessary in the development of every state and community. Large manufacturers and lumbermen are turning to practical forestry as a means of insuring the permanency of their industries. This is causing an increasing demand for trained men to manage our existing forests, provide for future crops, and reclaim barren non-agricultural lands by tree planting. The Government Forest Service calls for a number of college graduates each year and trains them in scientific forestry work. To meet these numerous demands for men, several colleges and universities, including this one, are giving courses of instruction in Forestry.

The questions that are of greatest importance in the development of forestry in Iowa are the formation, care and harvesting of the farm grove and woodlot and the prevention of stream erosion by tree planting, hence special attention is paid to these problems. Although Iowa is classed as a prairie state, yet there are excellent opportunities for practical study of forestry in many parts of the state. There are several planted groves and considerable timber upon and near the college campus.

The museum of the department contains a large collection of woods native to our country, tropical America and the Philippine Islands. This affords the student ample opportunity for becoming acquainted with the structure and gross appearance of the principal commercial timbers on the markets of this country.

FORESTRY

During the last dozen years forestry has advanced in this country from an almost unknown science to a profession of wide usefulness. The National Government, in view of the fast decreasing supply of timber, has now under control approximately 190 million acres of National Forest lands which are being put under systematic management for the continuous production of timber supplies and the prevention of destructive and wasteful exploitation.

Many of the states are acquiring title to the poorer classes of land and are holding them as State Forests, planting timber where necessary and managing such areas as are already wooded. Many of the railroads are taking up forestry work in one form or another; valuable timber lands are being managed for a continuous supply of ties; non-agricultural lands are being purchased and planted for tie production; preservative treating plants are being established for increasing the length of life of the less durable woods used for ties and telegraph poles.

Private forestry has been developing rapidly and many professional foresters are now employed by the larger firms. The growing of timber as a farm crop has gained a permanent place in agriculture. The farm is not complete without its woodlot and shelter belts for the production of fence posts and fuel and for the protection of the home grounds, orchard,

garden and stock. Forests have so large a place in the national life that every citizen shares to some extent in the benefits attending their proper management and establishment.

Forestry is housed in the new Hall of Agriculture where ample laboratory and class room is afforded. The museum contains the collection of American woods which was exhibited by Iowa at the Centennial Exposition and a large collection of South American and Philippine Island woods which were on display at the Louisiana Purchase Exposition. It also contains a large number of trunk specimens of trees which afford the student an opportunity to study the bark characteristics of trees not native to this region.

The Department has a collection of 600 lantern slides which are used to illustrate in the class room, the various phases of forestry work as carried on in different parts of the country. A partially wooded tract, belonging to the Department, serves as a demonstration area and affords ample room for the establishment and maintainance of small forest plantations. The college campus is planted with a large number of exotic trees and these, together with numerous old plantations in the vicinity, give the students a chance to observe the characteristics of many species and also to note the growth of woodlots under varying conditions.

COURSE IN HORTICULTURE AND FORESTRY

For Freshman year, see Agricultural Course, page 77.

Sophomore Year

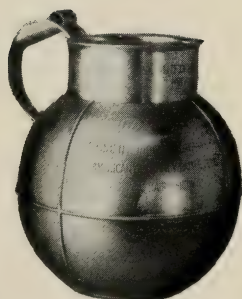
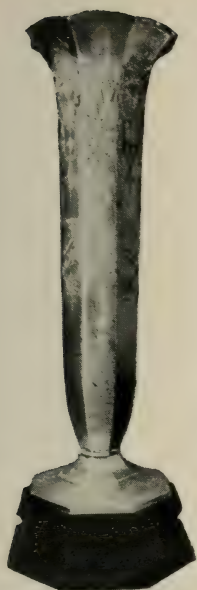
THIRD SEMESTER

		Required Semester Hours	
		Horticulture	Forestry
Horticulture 5,	Advanced Pomology	2 $\frac{2}{3}$	
*Agricultural Chemistry 25,	Organic Chemistry	3 $\frac{2}{3}$	3 $\frac{2}{3}$
Agricultural Engineering 4,	Farm Engineering	3 $\frac{1}{3}$	3 $\frac{1}{3}$
Botany 68,	Vegetable Physiology	3 $\frac{1}{3}$	3 $\frac{1}{3}$
Forestry 2,	Silviculture		2
*English 11,	Exposition	3	3
Economic Science 9,	Outlines of Economics	3	3
Military 3, or Athletics,		R	R
Total semester hours		19	18 $\frac{1}{3}$

* Class 1914 will take Agricultural Chemistry 21 instead of 25, and English 12 instead of 11.

FOURTH SEMESTER

		Semester Hours Required	
*Horticulture 2,	Plant Propagation	2 $\frac{2}{3}$	2 $\frac{2}{3}$
Agricultural Engineering 8,	Spraying Apparatus	1	



Trophies Won by Ames Students at National Dairy Show,
Chicago, December, 1908

Sweepstakes for Best All-round Judging, and Three Breed
Championships

Botany 62,	Dendrology	1 $\frac{2}{3}$	1 $\frac{2}{3}$
*English, 10,	Narration and Description	3	3
Forestry 3,	Advanced Silviculture		2
Forestry 17,	Forest Development and Policy	2	2
Economic Science 23,	Forest Economics		3
Choice {	Economic Science 10,	3	3
	History 6,		
	Europe in the XIXth Century		
Zoology 16,	General Zoology	4 $\frac{1}{3}$	4 $\frac{1}{3}$
Military 4, or Athletics,		R	R
		—	—
	Total semester hours	17 $\frac{2}{3}$	18 $\frac{2}{3}$

* Class of 1914 will take Agricultural Chemistry 23 instead of English 10 and Botany 61 instead of Horticulture 2.

HORTICULTURE GROUP

Junior Year

FIFTH SEMESTER

		Required Semester Hours
Horticulture 30,	Fruit Judging	2 $\frac{2}{3}$
**Horticulture 33,	Truck Farming	2
Civil Engineering 305,	Topographical Drawing	1
**Soils 1,	Soil Physics	4
Zoology 4,	Economic Entomology	3 $\frac{1}{3}$
***English 12,	Argumentation	2
*Horticulture 28,	Seminar	R
Public Speaking 10,	Extempore Speech	2
		—
		16
Electives will be selected from the list on page 147,	0	to 4
	—	—
	Total semester hours	16 to 20

* This course must be continued throughout the year. Final standing will not be certified to the recorder until the close of the sixth semester.

** Class of 1913 will take Agricultural Chemistry 25 instead of Soils 1, and Horticulture 5 instead of 33.

*** Class of 1914 will take Agricultural Chemistry 25 instead of English 12.

SIXTH SEMESTER

		Required Semester Hours
Horticulture 34,	Greenhouse Management	2 $\frac{2}{3}$
*Horticulture 28,	Seminar	1
Bacteriology 1,	General Bacteriology	4

* A continuation of work in fifth semester. Standing will be for the fifth and sixth semesters.

Botany 66,	Vegetable Pathology	2½
Botany 70,	Systematic Botany	2½
Soils 2,	Soil Fertility	4

—
17

Electives will be selected from the list on page 147 0 to 3

—
Total semester hours 16 to 20**Senior Year**

SEVENTH SEMESTER

Semester Hours
Required

Horticulture 8,	Landscape Gardening	2
Horticulture 9,	Research Work	2
*Horticulture 29,	Seminar	R
Horticulture 35,	Greenhouse Management	1
Botany 24,	Plant Embryogeny	1½
Horticulture 4,	Plant Breeding	2½
History 19,	History of Political Parties	2
Geology 10,	General Geology	4

—

Agricultural Journalism is required for Class of 1912

15½

Electives will be elected from the list on page 147, ¾ to 4¾

—
Total semester hours 16 to 20

* This course must be continued throughout the year. Final standing will not be certified to the recorder until the close of the eighth semester.

EIGHTH SEMESTER

Semester Hours
Required

Horticulture 13,	Thesis	2
Horticulture 10,	Development of American Horticulture	2
Horticulture 31,	Landscape Architecture	¾
Horticulture 29,	Seminar	1
Agricultural Journalism 2	Advanced Journalism or Newspaper Management	1
or 4,	Novel and Romance	3
**Literature 3,	Soil Surveying and Mapping	1½
Soils 13,		

—
11½

Electives will be elected from the list on page 147, 4¾ to 8¾

—
Total semester hours 16 to 20

** Or any three hour Literature in elective list.

FORESTRY GROUP

Junior Year

FIFTH SEMESTER

		Required Semester Hours.
Forestry 4,	Lumbering	2
Forestry 7,	Forest Mensuration	2 $\frac{1}{3}$
*Forestry 18,	Seminar	R
**Botany 63,	Dendrology	1 $\frac{2}{3}$
Civil Engineering 557,	Surveying	4
**Soils 1,	Soil Physics	4
Zoology 4,	Economic Entomology	3 $\frac{1}{3}$
***English 12,	Argumentation	2
Forestry 5,	Applied Lumbering (to be taken during the winter vacation in some lumbering region)	—
Total semester hours		19 $\frac{1}{3}$

* This course must be continued through the year. Final standing will not be certified to recorder until the close of the sixth semester.

** The class of 1913 will take Agricultural Chemistry 25 instead of Soils 1 and elective work instead of Botany 63.

*** The class of 1914 will take Agricultural Chemistry 25 instead of English 12.

SIXTH SEMESTER

		Required Semester Hours.
Forestry 6,	Forest Utilization	1
Forestry 8,	Forest Mensuration	2 $\frac{1}{3}$
Forestry 14,	Wood Technology	1 $\frac{2}{3}$
Forestry 16,	Camp Technique	1
Civil Engineering 659,	Timber Testing	1 $\frac{2}{3}$
*Forestry 18,	Seminar	1
Botany 70,	Systematic Phanerogams	2 $\frac{2}{3}$
Botany 64,	Range Forage Plants and Ecology	1 $\frac{2}{3}$
Civil Engineering 658,	Surveying	4
**History 19,	History of Political Parties	2
		—
		19
Electives will be selected from the list on page 147,		0 to 1
		—

Total semester hours 19 to 20

* A continuation of work in fifth semester. Standing will be for the fifth and sixth semesters. One hour credit for both semesters' work will be recorded at close of sixth semester.

** The classes of 1913 and 1914 will take electives instead of History 19.

Senior Year

SEVENTH SEMESTER

		Required Semester Hours
Forestry 9,	Forest Management	2
Forestry 11,	Forest Protection	1
Forestry 12,	Forest Administration	2
*Forestry 19,	Seminar	
{ Choice {	Botany 24, and	4½
	Horticulture 4,	
	Bacteriology 15,	
	General Bacteriology 2½	
Horticulture 8,	Plant Embryogeny 1½	
Agricultural Journalism 1,	Plant Breeding 2½	
Geology 10,	Landscape Gardening	2
	Agricultural Journalism	1
	General Geology	4

16½

Electives will be selected from the list on page 147, 0 to 3½

Total semester hours 16½ to 20

* This course must be continued through the year. Final standing will not be certified to recorder until the close of the eighth semester.

EIGHTH SEMESTER

		Required Semester Hours
Forestry 10,	Forest Management	2
Forestry 13,	Thesis	2
**Forestry 19,	Seminar	1
Botany 65,	Forest Mycology and Pathology	2½
Soils 2,	Soil Fertility	4
***Soils 13,	Soil Surveying and Mapping	1½
Public Speaking 11,	Extempore Speech	2

15

Electives will be selected from the list on page 147 1 to 5

Total semester hours 16 to 20

** A continuation of work in seventh semester. Standing will be for the seventh and eighth semesters. One hour credit for both semesters' work will be recorded at close of eighth semester.

*** The class of 1912 will take elective work in place of Soils 13. Required for class of 1912, Forestry 14, Wood Technology.

COURSES IN HORTICULTURE

2. **Plant Propagation.** Propagation of plants by sexual and non-sexual methods, germination, testing and storage of seeds, multiplication of plants by cuttage, layerage and graftage, including both greenhouse

and nursery types. Recitations, two hours, and laboratory, two hours, per week. Two and two-thirds hours' credit. Fee, \$1.00.

3. **Orcharding.** The establishment and care of home orchards and vineyards; systematic study of varieties adapted for planting in Iowa. Recitations, two hours, and laboratory, two hours, per week. Two and two-thirds hours' credit. Fee, \$1.00.

4. **Plant Breeding.** Study of the principles of plant breeding and their application to the improvement of plants. Horticulture 2, Botany 11, prerequisite, and Botany 24, prerequisite or required with this course. Lectures and recitations, two hours, and laboratory, two hours, per week. Two and two-thirds hours' credit. Fee, \$1.00.

5. **Advanced Pomology.** Commercial orcharding; grading, storing, and marketing fruit; orchard and nursery technique. Prerequisite, Horticulture 3. Recitations, two hours, and laboratory, two hours, per week. Two and two-thirds hours' credit. Fee, \$1.00.

8. **Landscape Gardening.** A study of the principles involved in the planting and decoration of home grounds and parks; ornamentals adapted to planting in Iowa. The ornamental trees and shrubs on the campus and in the department afford excellent material for laboratory work. Two lectures per week. Two hours' credit.

9. **Research Work.** An independent investigation in some line of work under the supervision of the head of the department. Two hours per week. Two hours' credit.

10. **Development of American Horticulture.** A historical survey of the development of American Horticulture. Two lectures per week. Two hours' credit.

13. **Thesis.** The subject chosen must be one requiring independent investigation, the results of which are to be presented in a carefully written report. May be a continuation of Course 9. Two hours' credit.

28. **Horticultural Seminar.** Seminar in Horticulture will meet once in two weeks while the College is in session, and has for its members the professors and instructors in Horticulture, and all students in the Junior and Senior classes in the course in Horticulture. The work will consist in the preparation, presentation, and discussion of papers on Horticultural topics. All papers must be carefully written and submitted to the professor in charge. The credit in this subject will be reported to the recorder at the close of the spring semester. One hour credit.

29. **Horticultural Seminar.** A continuation of Course 28. The credit to be reported at the close of the eighth semester. One hour credit.

30. **Fruit Judging.** Scoring and judging plate displays and collections of fruit. Special attention given to the leading commercial varieties of the apple. Prerequisite, Horticulture 2 or 3. Laboratory, two hours per week. Two-thirds hour credit.

31. **Landscape Architecture.** A laboratory course in landscape designing. Prerequisite, Horticulture 8 or 11. One laboratory per week. Two-thirds hour credit.

32. **Landscape Architecture.** A continuation of Course 31 and may be taken simultaneously. One laboratory per week. Two-thirds hour credit.

33. **Truck Farming.** A course dealing with growing, and marketing of the more important truck crops grown in this state, such as the potato, cabbage, onion and tomato. Two lectures per week. Two hours' credit.

34. **Greenhouse Management.** A study of the more important greenhouse crops and their cultural requirements, including ventilation, watering and heating. The laboratory work includes routine operations of the greenhouse. Lectures, two hours, and laboratory, two hours, per week. Two and two-thirds hours' credit.

35. **Greenhouse Management.** A continuation of Horticulture 34, designed to give the student practical experience in the various greenhouse operations through the different seasons of the year. One laboratory per week. One hour credit.

COURSES IN FORESTRY

1. **Farm Forestry.** A study of the different parts of the tree; the functions of the different parts; the requirements of trees for light, heat, and moisture; their relation to each other in the forest; a study of the more important commercial species. Attention is given to the influence of forests in the modification of climatic conditions with special reference to the effect of windbreaks in agricultural districts. The establishment of windbreaks, shelter-belts, and farm woodlots in Iowa. The species best suited for planting, kind of stock to plant, cost of planting and care of plantations; seasoning and preservative treatment of farm timbers. This course is designed to treat such problems as are of special interest to the Iowa farmers. Text, Principles of American Forestry, by Samuel B. Green. Recitation two hours per week. Two hours' credit.

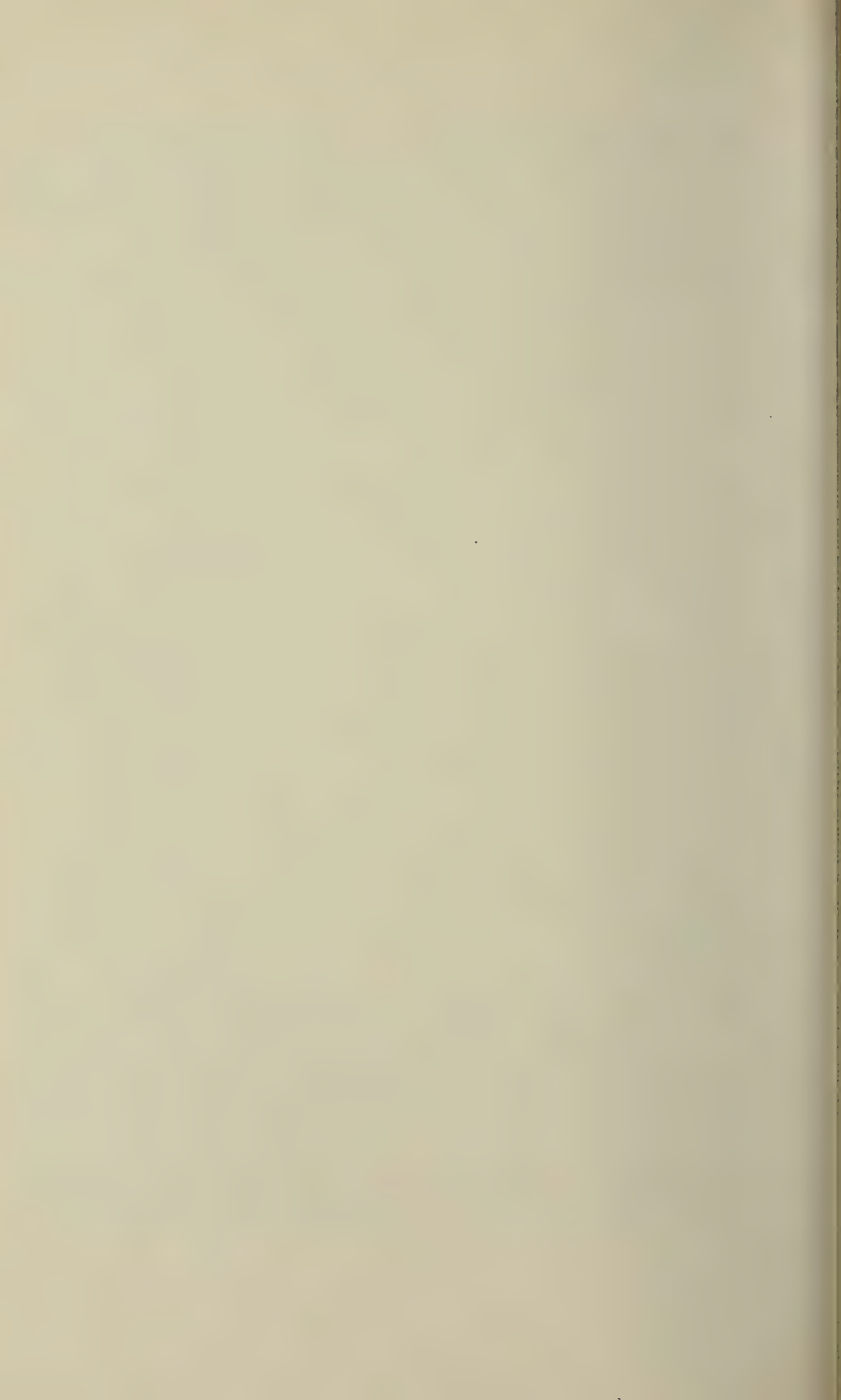
2. **Silviculture.** Methods of natural and artificial regeneration; study of forest types and silvicultural systems under different forest conditions. Two hours recitation or equivalent in field work. Two hours credit.

3. **Advanced Silviculture.** A continuation of course 2. Sowing seeds; establishment of forest nurseries; care of seedlings; transplanting and planting seedlings; pruning; thinning; making of improvement cuttings; under-planting; etc. A detailed study of the silvicultural characteristics of the more important trees of the United States. Two hours recitation, or equivalent in field work. Two hours' credit.

4. **Lumbering.** Brief history of lumbering in the United States. A detailed study of methods of logging and milling in different regions. The course embraces the construction of camps; felling, skidding, driv-



Students Determining the Volume of Trees



ing, and booming timbers; railroad hauling, cable logging, grading, and marketing lumber products. Two hours recitation and lecture work. Two hours' credit.

5. **Applied Lumbering.** (Prerequisite, Forestry 4, Lumbering). This course will be taken in a lumbering region during the winter vacation. The student will spend from three to four weeks making studies in lumber camps, saw-mills, paper pulp factories, and veneer factories. The results of the study will be submitted in a report.

6. **Forest Utilization.** A study of secondary or minor forest products, wood pulp and paper, naval stores, tan bark and tanning extract, charcoal, wood alcohol, maple sugar, etc. Lecture and reference work. One hour recitation. One hour credit.

7. **Forest Mensuration.** The use and construction of log rules; determination of the contents of logs in board feet, standards and reference work. One hour recitation. Two and one-third hours' credit. Fee, \$1.00.

8. **Forest Mensuration.** A continuation of Forestry 7. The construction and use of volume and yield tables. Determination of age and periodic growth of single trees and stands. Methods of timber estimating. Text "Forest Mensuration," by H. S. Graves. One hour recitation. Four hours field work. Two and one-third hours credit. Fee, \$1.00.

9. **Forest Management.** The regulation of the forests to secure a sustained annual or periodic yield. Forest working plans in the United States and abroad. Two hours recitation. Two hours credit.

10. **Forest Management.** Determination of the profit in forestry, rate of interest yielded, expectation value, cost value, sale value, and rental value of the forest. Two hours recitation. Two hours credit.

11. **Forest Protection.** Injuries to the forest by fire, insects, grazing, and trespass. The establishment of fire lines; patrolling; establishment of fire lookout stations; restrictions of railroads crossing forests; campfires; penalties for violation of laws. A study of the more destructive forest insects and methods of control. Grazing restrictions with regard to goats, cattle, horses, and sheep. One hour recitation. One hour credit.

12. **Forest Administration.** The administration of private, corporate, state, and national forests; organization of the Forest Service, qualifications and duties of forest officers; handling of timber sales; location of administrative sites; permanent improvements, buildings, fences, telephone lines, roads, trails, etc., (aside from those considered under Forest Protection). The listing of lands under the Forest Homestead Act of June 11, 1906. The allotment of range for grazing, grazing fees, fiscal matters, use of special forms, etc. Two hours recitation. Two hours credit.

13. **Thesis.** The subject chosen must be one relating to forestry which requires original independent investigation. The results to be

presented in a carefully written report. It may be a continuation of course 15. Two hours' credit.

14. **Wood Technology.** A study of the economic woods of the United States; means of identification by characters such as grain, texture, color, density, odor, hardness, and toughness. Imperfections of timber such as frost cracks, shakes, resin pockets, loose and sound knots, etc. Causes of shrinking, checking, and warping. Methods of seasoning. The preservative treatment of timbers. In the laboratory the more important species of woods will be distinguished with the aid of the hand lens and again under the compound microscope. Lecture and class work, one hour. Laboratory, two hours. One and two-thirds hours' credit. Fee, \$2.00.

15. **Research.** An independent investigation in some line of forestry work under the supervision of the instructors in forestry. Two hours' work. Two hours' credit.

16. **Camp Technique.** Camp equipment; tents, wagons, horses, provisions, bedding, etc. Location of camps; care of camp fires; use of the pack saddle. One hour lecture and demonstration per week. One hour credit.

17. **Forest Development and Policy.** History of forestry in foreign countries from the earliest times to the present. The advance of forestry in the United States. The progress of state forestry. Federal and state laws for the encouragement of forestry. Text "History of Forestry," by Fernow. Two hours recitation. Two hours credit.

18. **Forestry Seminar.** The Forestry Seminar will meet once in two weeks while the College is in session, and have for its members the instructors in Forestry and all students in the Junior and Senior classes in the course in Forestry. The work will consist in the preparation, presentation, and discussion of papers on Forestry topics. All papers must be carefully written and submitted to the professor in charge. The credit in this subject will be reported to the recorder at the close of the spring semester. One hour credit.

19. **Forestry Seminar.** A continuation of course 18. The credit to be reported at the close of the eighth semester. One hour credit.

Department of Agricultural Engineering

JAY BROWNLEE DAVIDSON, PROFESSOR

EVERETT WALTER HAMILTON, ASSISTANT PROFESSOR

DANIEL WILLIS SYLVESTER, INSTRUCTOR

CHARLES OSMOND ALEXANDER, INSTRUCTOR

E. Y. CABLE, EXTENSION WORK

The development of modern agricultural machinery, the increase in the size and importance of farm structures, the improvement of land by drainage and its reclamation by irrigation and the need of better roads,

demand that the successful farmer of today must be trained along mechanical and engineering lines. To supply this training and to investigate problems related thereto is the work of the Department of Agricultural Engineering.

It is believed that the Department of Agricultural Engineering has the most complete equipment of any similar department in existence. The department occupies the two lower floors of Agricultural Engineering Hall and practically all of Agricultural Engineering Annex, a fireproof building connected with former building on the ground and first floors.

The farm machinery laboratories are located on the ground and first floors of the Annex. Each floor has a large balcony entirely surrounding the room and increasing the floor space by over one-half. A large assortment of the best modern farm machinery is contained in these laboratories.

The farm machinery equipment contains samples of traction engines, gasoline tractors, and one or more samples of almost every kind of the important lines of field and power machine used on the farm. Special apparatus for testing draft adjustment and quality of work is used in connection with these machines, including a Kohlbush direct reading dynamometer, a Stone and Polikeit recording traction dynamometers and a special chain recording transmission dynamometer of twenty-five horsepower capacity. By means of this instrument, it is possible to accurately measure the power consumed by the smallest belt-driven machines as well as those requiring the full capacity of the instrument. Numerous other small instruments and parts of machines are used in this connection.

For instruction in gasoline engines, eight modern engines are provided, nearly every one representing a different type of construction. To test these, suitable brakes, indicators and other testing appliances are owned by the Department.

The steam engine laboratory contains a simple twenty horsepower engine and a thirty-five horsepower compound reversing engine. Steam is now provided from the heating plant back of the building, but a boiler will be placed in the laboratory within the next year.

Two drawing rooms are provided which will accommodate twenty-five and forty students, respectively. The cement laboratory contains bins for materials, molds, forms, an improved Fairbanks cement testing machine, and smaller apparatus. The pump laboratory contains an assortment of pumps, cylinders, tanks, and the spraying apparatus.

For teaching the course in Farm Engineering, the following instruments are provided: two Gurley transits, one Burger level, five Queen levels, five Gurley levels, and two Bostrom and Brady levels; also rods, flagstaffs, chains, hatchets, etc.

In the museum, samples of materials and ancient implements are kept. A reading and seminar room has files of all the leading periodicals pertaining to agricultural engineering and is used as a meeting room for the Agricultural Engineering Seminar.

The Forge shop is equipped with twenty Buffalo down draft forges

and individual tool sets together with a complete set of special tools, a press drill and grinder. The carpenter shop has benches and tool sets for thirty students and a miscellaneous tool equipment is provided in the tool room. This shop is also provided with a power cross cut and rip saw, a planer and two speed lathes.

The work of the Department is carried on in conjunction with the Agricultural Engineering Section of the Agricultural Experiment Station. An experimentalist devotes his entire time to research and is provided with a separate laboratory. This laboratory has many special instruments in the way of dynamometers, indicators, and testing machines, and also a tool equipment including a fourteen-inch engine lathe.

Commodious offices are provided for the members of the Department, in which is to be found a complete implement and farm machine catalog file, also a valuable collection of farm building plans.

COURSE IN AGRICULTURAL ENGINEERING

The work of the Department is principally that of giving instruction to those who intend to make the farm the object of their life work; however, the demand for instructors and others trained along these lines requires the department to offer special instruction to meet this demand.

Positions Open for Men Trained Along Agricultural Engineering Lines

The course in Agricultural Engineering is designed to fit graduates for the following lines of work:

1. Managers and superintendents of farms, where drainage, irrigation and the use of agricultural machinery is a large factor in the management.
2. Teachers and instructors of Agricultural Engineering in agricultural colleges.
3. Teachers of practical mechanics in Agricultural High Schools.
4. Government experts in Agricultural Engineering.
5. Professional work in drainage and highway engineering.
6. Positions in the farm machinery industry requiring mechanical skill and a knowledge of the science of agriculture.

The degree of Bachelor of Science in Agricultural Engineering (B. S. in A. E.) is given to students who have completed a four-year course in Civil, Mechanical, or Electrical Engineering, followed by one year's prescribed work approved by the faculty, in Agricultural Engineering and related sciences, under the rules and conditions governing work in other courses.

This course is designed to be especially strong along the fundamental sciences upon which Agricultural Engineering depends.

COURSE IN AGRICULTURAL ENGINEERING

Freshman Year

FIRST SEMESTER

		Required Semester Hours
Agricultural Engineering 1 or 2,	Shop Work	1½
Animal Husbandry 1,	Market Types of Cattle and Sheep	2
English 11,	Exposition	3
Farm Crops 1,	Corn Growing and Judging	2⅔
History 17,	The American People	1
Horticulture 3,	Orcharding	2⅔
Mathematics 120,	Algebra	4
Mathematics 121,	Plane Trigonometry	1
Mechanical Engineering 181,	Mechanical Drawing	1
Military 1,	Military Drill	R
Library 1,	Library Instruction	R
		—
	Total semester hours	18⅔

SECOND SEMESTER

		Required Semester Hours
Agricultural Engineering 1 or 2,	Shop Work	1½
Animal Husbandry 2,	Market Types of Dairy Cattle, Horses and Swine	2
Dairying 12,	Farm Dairying	2⅔
English 10,	Narration and Description	3
Farm Crops 2,	Grains, Grasses and Forage Crops	2⅔
Mathematics 222,	Trigonometry	2½
Mathematics 223,	Analytical Geometry	2½
Mechanical Engineering 220,	Descriptive Geometry	2
Military 2,	Military Drill	R
		—
	Total semester hours	18⅔

Sophomore Year

THIRD SEMESTER

		Required Semester Hours
Agricultural Engineering 16	Farm Machinery	2⅔
Chemistry 21,	Agricultural Chemistry	4⅔
Mathematics 324,	Analytical Geometry	2
Mathematics 325,	Calculus	3

Mechanical Engineering 322,	Mechanical Drawing	1
Physics 303,	Mechanics and Heat	5
Military or Athletics,		R
		—
	Total semester hours	18

FOURTH SEMESTER

		Required Semester Hours
Agricultural Engineering 17,	Farm Motors	2
Chemistry 23,	Elementary Experimental Chem- istry	4½
Mathematics 426,	Differential and Integral Calculus	5
Mechanical Engineering 401,	Analytical Mechanics	3
Physics 404,	Electricity and Magnetism and Light and Sound	5
Military or Athletics,		R
		—
	Total semester hours	19½

Junior Year

FIFTH SEMESTER

		Required Semester Hours
Agricultural Engineering 3,	Farm Blacksmithing and Horse- shoeing	1½
Agricultural Engineering 18,	Farm Motors	2
Agricultural Engineering 19,	Farm Building Equipment	1
Horticulture 8,	Landscape Gardening	2
*Agricultural Engineering 14,	Seminar	R
Civil Engineering 345,	Surveying	2
Mechanical Engineering 502,	Analytical Mechanics	5
Mechanical Engineering 512,	Engineering Laboratory	1
Soils 1,	Soil Physics	4
		—
	Total semester hours	18½

* This course must be carried throughout the year, and final standing will not be certified to the recorder until the close of the sixth semester.

SIXTH SEMESTER

		Required Semester Hours
Agricultural Engineering 6,	Farm Structures	3
*Agricultural Engineering 14,	Seminar	1
Agricultural Engineering 20,	Drainage and Irrigation	1½
Civil Engineering 653,	Materials of Construction	2

Civil Engineering 446,	Surveying	2
Mechanical Engineering 606,	Analytical Mechanics	5
Mechanical Engineering 613,	Engineering Laboratory	1
Soils 2,	Soil Fertility	4
		—
Total semester hours		19 $\frac{2}{3}$

* (See note in fifth semester).

Senior Year

SEVENTH SEMESTER

SEVENTH SEMESTER		Required Semester Hours.
*Agricultural Engineering 15,	Research in Agricultural En-	
	gineering	2
Agricultural Engineering 15,	Seminar	R
Animal Husbandry 20,	Animal Feeding	2
Civil Engineering 712,	Roads and Pavements	2
Farm Crops 8,	Farm Management	2 $\frac{2}{3}$
English 12,	Argumentation	2
Economic Science 9,	Outlines of Economics	3
Mecchanical Engineering 714,	Laboratory	1
		—
		14 $\frac{2}{3}$
Electives will be selected from list on page 147,		1 $\frac{1}{3}$ to 5 $\frac{1}{3}$.
		—
Total semester hours		16 to 20

* This course must be carried throughout the year, and final statements will not be certified to the recorder until the close of the eighth semester.

EIGHTH SEMESTER

		Required	
		Semester Hours	
Agricultural Engineering 11,		3	5
*Agricultural Engineering 15,	Seminar	1	1
History 18,	The American Statesman	1	1
Horticulture 31,	Landscape Laboratory	$\frac{2}{3}$	$\frac{2}{3}$
Mechanical Engineering 533,	Shop Work	2	2
		—	—
		$7\frac{2}{3}$	$9\frac{2}{3}$
Electives will be selected from list on page 147,		$8\frac{1}{3}$ to	$12\frac{1}{3}$
		—	—
Total semester hours		16	to 20

* (See note seventh semester).

COURSES IN AGRICULTURAL ENGINEERING

1. **Shop Work.** Blacksmithing, forging and welding of iron and steel, and making and tempering hand-tools. Work designed to be ex-

pecially helpful in the repair and operation of machinery. One and one-third hours' credit. Four hours per week. Fee, \$2.50.

2. **Shop Work.** Carpentry, care, use and sharpening of tools, laying off work, making of joints and framing. Work designed to be especially helpful in planning, framing, and construction of farm buildings. One and one-third hours' credit. Four hours per week. Fee, \$2.50.

3. **Farm Blacksmithing and Horse Shoeing.** An advanced course in blacksmithing. One and one-third hours' credit. Laboratory, four hours per week. Fee, \$2.50.

4. **Farm Engineering.** Includes instruction in Agricultural Surveying, also a study of location of drainage districts, drainage laws, and best systems of drainage; location and construction of roads; the building of fences and concrete construction in farm work; also drawing, including lettering, map making, planning of drainage systems and road profiles; and field work, including care, adjustment and practice in the use of surveying instruments. Prerequisite, Mathematics 17. Three and one-third hours' credit. Recitation, two hours, and laboratory, four hours, per week. Fee, \$2.00.

5. **Farm Machinery and Farm Motors.** Includes a brief study of mechanics and materials; a study of the development, construction, functions and methods of operating, adjusting and repairing implements and machinery; also the study of the principles of draft and the production of power. Laboratory work devoted to the comparative analysis and testing the machines discussed in the class room. Two and two-thirds hours' credit. Recitations, two hours, and laboratory, two hours. Fee, \$2.00.

6. **Farm Structures.** Embraces the planning of all farm buildings, a study of their construction, lighting, ventilation, cost, convenience, also testing the strength of building materials, and making of plans and specifications. Prerequisite, Agricultural Engineering 4. Three hours' credit. Recitation, one hour, and laboratory, six hours, per week.

7. **Dairy Engineering.** Special work in the management, care and operation of steam and gasoline engines. One and two-thirds hours' credit. Recitation, one hour, and laboratory, two hours, per week. Fee, \$2.00.

8. **Spraying Apparatus.** Precedes Field Practice in Horticulture 7 in the same semester. A brief study of the mechanics of pumps, also the care, operation and repair of spraying apparatus. One hour credit. Recitation, one hour, and laboratory, three hours, per week for one-half semester. Fee, \$1.00.

9. **Research Work in Agricultural Engineering.** The large equipment of machinery and instruments in this department offers to the student a wide range of subjects for research work, as Drainage, Farm Water Supply, Sewerage, Road Construction, Fences, Use of Cement on the Farm, Testing and Calibrating Various Farm Machines and Traction

Tests. Prerequisites, Agricultural Engineering 4 and 5. Two hours' credit. Fee, \$2.00.

10. **Research Work in Agricultural Engineering.** Work same as in 9. Prerequisites, Agricultural Engineering 4 and 5. Two hours' credit. Fee, \$2.00.

11. **Thesis.** Must be upon some subject requiring original work taken in Agricultural Engineering. Three hours' credit.

12. **Thesis.** Same as Agricultural Engineering 11, except five hours' credit.

13. **Gas and Oil Engines.** May be substituted for part of Agricultural Engineering 9 and 10 in the Agricultural Engineering Course. A comprehensive course in the practical operation and management of the internal combustion engine. The course includes a study of the development, the existing types, the theory and practice of operation, the adjustment, the repair and the utility of gas, gasoline, oil, and alcohol engines. The laboratory work will consist of well arranged tests and exercises to familiarize the student with the practical care and management of this type of motor. One recitation and one laboratory period per week. Two hours' credit. Fee, \$2.00.

14. **Agricultural Engineering Seminar.** One hour credit.

15. **Agricultural Engineering Seminar.** One hour credit.

The Agricultural Engineering Seminar (Courses 14 and 15) meets once each two weeks while College is in session and has for its members the professors and instructors in Agricultural Engineering and all students in the Junior and Senior Classes in the course in Agricultural Engineering. This consists in the preparation, presentation and discussion of papers on Agricultural Engineering subjects. All papers must be carefully written and submitted to the professor in charge. The schedule of subjects are made up one semester in advance.

16. **Farm Machinery.** Includes the elements of machines, the measurement and transmission of power, the development, use, adjustment, construction and repair of farm machinery. Two and two-thirds hours' credit. Recitation two hours; laboratory, two hours. Fee, \$2.00.

17. **Farm Motors.** The production of power for agricultural purposes. The horse as a motor, tread and sweep powers, steam, gas, gasoline, oil, air, engines, and tractors, windmills, electric power as far as applicable to agricultural purposes. Two hours' credit. Recitation, one hour. Laboratory, three hours. Fee, \$2.00.

18. **Farm Motors.** Continuation of 17. Recitation, one hour, laboratory, three hours. Two hours' credit. Fee, \$2.00.

19. **Farm Building Equipment.** The lighting, heating and ventilation of farm buildings. Sanitary construction, plumbing, systems of water supply and sewage disposal. Recitation, one hour. One hour credit.

20. **Drainage and Irrigation.** The drainage of farm lands by tile drains and open ditches. Drainage engineering method preliminary and

construction surveys, specifications, reports and estimates. Drainage law and assessments. Drain tile, irrigation methods, application and measurement of water. A sewage irrigation project with the Irrigation Investigations of United States Department of Agriculture is carried on at the College and offers an opportunity for study of this phase of the subject. Recitation one hour. Laboratory two hours. One and two-third hours' credit. Fee, \$2.00.

21. **Cement Construction.** The use of cement in farm building construction. Cement testing study mixtures, construction of forms, reinforcements. Also other building materials. One two-hour period per week divided between recitation and laboratory. One hour credit. Fee, \$2.00.

Department of Agricultural Education

ASHLEY VAN STORM, PROFESSOR

The field of agriculture presents such rapid changes, and there is such wide and varied demand for young men combining agricultural and scientific training, that it has been deemed advisable to offer a course less technical than the other agricultural courses.

The course in Agricultural Education is designed to meet the demands of high schools and other institutions, public and private, giving instruction in the general sciences and agriculture. There is a large demand for strong, broadly educated, well trained teachers for this and other kinds of agricultural instruction in public and preparatory schools where the work is now being introduced.

A new phase of agricultural education has developed in recent years in the various forms of agricultural extension work. This movement is destined to be far-reaching in its results, and it is clearly one of the most potent influences in the field of agriculture. This phase of agricultural instruction, which is bringing science to the aid of agriculture by reaching the man in the field and on the farm, the children in the public school, the family in the home, is calling for well trained men far in excess of the supply.

COURSE IN AGRICULTURAL EDUCATION

Freshman Year

FIRST SEMESTER

		Required Semester Hours
Botany 70,	Systematic Botany	2½
Mathematics 17,	Algebra and Trigonometry	3
History 3,	The West in American History	3
Agricultural Chemistry 21,	General Chemistry	4½
Farm Crops 1,	Corn Growing and Judging	2½

Animal Husbandry 1,	Market Types of Cattle and	} 2 or $2\frac{1}{3}$	R
or	Sheep		
*Home Economics 1,	Sewing		
Military 1,			

17 $\frac{2}{3}$ or 18

SECOND SEMESTER

		Required Semester Hours
Physics 205,	Mechanics, Light and Heat	3
Agricultural Chemistry 23,	Qualitative Analysis	$4\frac{1}{3}$
Zoology 16,	General Zoology	$4\frac{1}{3}$
Public Speaking 2,	The Declamation	1
Farm Crops 2,	Small Grains	$2\frac{2}{3}$
Animal Husbandry 2,	Market Types of Dairy Cattle,	} 2 or $2\frac{1}{3}$
or	Horses and Swine	
*Home Economics 4,	Sewing	
Military 2,		R

17 $\frac{1}{3}$ or 17 $\frac{2}{3}$

Sophomore Year

THIRD SEMESTER

		Required Semester Hours
English 11,	Exposition	3
Zoology 4,	Entomology	$3\frac{1}{3}$
Agricultural Chemistry 25,	Organic Chemistry	$3\frac{2}{3}$
Horticulture 3,	Orcharding	$2\frac{2}{3}$
Public Speaking 10,	Extempore Speech	} 2
or		
*Public Speaking 15,	Home Economics Public Speaking	
Animal Husbandry 3,	Breed Types of Cattle and	} $3\frac{1}{3}$
or	Sheep	
*Home Economics 6,	Dress Making $2\frac{1}{3}$	
and Elective	1	} $3\frac{1}{3}$ R
Military 3 or Athletics,		
		18

FOURTH SEMESTER

		Required Semester Hours
Botany 68,	Vegetable Pathology	$3\frac{1}{3}$
Animal Husbandry 4,	Breed Types of Dairy Cattle,	} $3\frac{1}{3}$
or	Horses and Swine	
*Home Economics 7,	Dress Making $2\frac{1}{3}$	
and Electives	1	} $3\frac{1}{3}$
Economic Science 14,	Outlines of Economics	
Horticulture 2,	Plant Propagation	$2\frac{2}{3}$

English 10,	Narration and Description	3
Agricultural Chemistry 26,	Agricultural Analysis	3½
Military 4, or Athletics,		R
		—
		17½

Junior Year

FIFTH SEMESTER

Required Semester Hours

Required:

Soils 1,	Soil Physics	4
Horticulture 4,	Plant Breeding	2½
Botany 24,	Plant Embryogeny	1½
Electives,	(See Notes 2, 3, 4, 5 and 6)	7½ or 11½
		—
		16 or 20

Electives:

Agricultural Engineering 1,	Shop Work	1½
Agricultural Engineering 2,	Shop Work	1½
Agricultural Engineering 3,	Farm Blacksmithing and Horse Shoeing	1½
Agricultural Engineering 4,	Farm Engineering	3½
Agricultural Engineering 7,	Dairy Engineering	1½
Animal Husbandry 11,	Feeding and Management of Live Stock	2
Animal Husbandry 9,	Animal Nutrition and Packing House By-Products	2
Animal Husbandry 21,	Principles of Breeding	2
Agricultural Journalism 1,	Agricultural Journalism	1
Horticulture 33,	Truck Farming	2
Horticulture 5,	Advanced Pomology	2½
Forestry 1,	Farm Forestry	2

SIXTH SEMESTER

Required Semester Hours

Required:

Soils 2,	Soil Fertility	4
English 12,	Argumentation	2
Electives,	(See Note 1)	3
Electives,	(See Notes 2, 3, 4, 5 and 6)	7 or 11
		—
		16 or 20

Electives:

Agricultural Engineering 5,	Farm Machinery and Motors	2½
Agricultural Engineering 6,	Farm Structures	3
Agricultural Engineering 8,	Spraying Apparatus	1

Animal Husbandry 12,	Feeding and Management of Live Stock	2
Animal Husbandry 33,	Incubator Practice	1
Agricultural Journalism 2,	Agricultural Journalism	1
Dairying 11,	Cheese Making	3
Dairying 12,	Farm Dairying	2 $\frac{2}{3}$
Dairying 13,	Milk Testing and Milk Inspection	1 $\frac{2}{3}$
Dairying 16,	Technology of Milk	1
Farm Crops 12,	Advanced Grain Judging	1 $\frac{2}{3}$
Horticulture 34,	Greenhouse Management	2 $\frac{2}{3}$
History 6,	Europe in the 19th Century	3
Horticulture 10,	Development of American Horticulture	2
Forestry 17,	Forest Development and Policy	2

Senior Year

SEVENTH SEMESTER

		Required Semester Hours
<i>Required:</i>		
Farm Crops 3,	Corn and Small Grain Judging	2
Literature 4,	American Literature	3
Electives,	(See Note 1)	3
Electives,	(See Notes 2, 3, 4, 5 and 6)	8 or 12
		<hr/>
		16 or 20
<i>Electives:</i>		
Agricultural Chemistry 27,	Agricultural Analysis	3 $\frac{1}{3}$ or 5
Agricultural Chemistry 40,	Dairy Chemistry	3 $\frac{1}{3}$
Animal Husbandry 6,	Advanced Live Stock Judging	1 $\frac{1}{3}$
Animal Husbandry 9,	Animal Nutrition	2
Animal Husbandry 20,	Animal Feeding	2
Animal Husbandry 22,	Animal Husbandry Seminar	1
Animal Husbandry 23,	Animal Husbandry Seminar	1
Animal Husbandry 31,	Poultry Management	2 $\frac{2}{3}$
Animal Husbandry 32,	Practice in Feeding and Management	1
Animal Husbandry 35,	Poultry Research and Experimentation	1
Dairying 17,	Dairy Bacteriology	4
Farm Crops 8,	Farm Management	3
Farm Crops 11,	Advanced Corn Judging	1
Horticulture 8,	Farm Landscape Gardening	2
Horticulture 9,	Research Work in Horticulture	2
Soils 3,	Research Work in Soils	2

Soils 6,	Advanced Soil Fertility	2
Soils 13,	Soils Surveying and Mapping	1½
Soils 15,	Advanced Laboratory Work in Soils Physics	2

EIGHTH SEMESTER

Required
Semester Hours*Required:*

Farm Crops 4,	Corn and Small Grain Breeding	1½
Botany 5,	Vegetable Pathology	3
Electives,	(See Note 1)	3
Electives,	(See Notes 2, 3, 4, 5 and 6)	8½ or 12½
		— or —
		16 or 20

Electives:

Agricultural Chemistry 34,	Advanced Agricultural Analysis	3½ or 5
Agricultural Engineering 9,	Research Work	2
Animal Husbandry 7,	Animal Breeding	2
Animal Husbandry 8,	Animal Breeding	2
Animal Husbandry 13,	Advanced Work in Beef Pro- duction	1
Animal Husbandry 14,	Advanced Work in Beef Pro- duction	1
Animal Husbandry 15,	Milk Production	1
Animal Husbandry 16,	Advanced Work in Mutton and Wool Production	1
Animal Husbandry 17,	Advanced Work in Horse Feeding	1
Animal Husbandry 30,	Poultry Judging	2½
Animal Husbandry 34,	Brooder Practice	1
Animal Husbandry 36,	Poultry Research and Ex- perimentation	1
Animal Husbandry 37,	Advanced Poultry Management	2½
Dairying 20,	Factory Management	3½
Dairying 21,	Preparation of Ice Cream and Ices	1½
Dairying 24,	Fancy Cheese Making	2½
Farm Crops 9,	Research Work	2
Forestry 14,	Wood Technology	1½
Civil Engineering 659,	Timber Testing	1½
Soils 7,	Investigation of Special Soils	1
Soils 14,	Advanced Soil Bacteriology	3
Soils 16,	Advanced Laboratory Work in Soil Fertility	2
History 4,	Reconstruction and National Expansion	3

Note 1. The student must elect, subject to the approval of the head of the department, not fewer than three hours each semester from the courses in Agricultural Education.

Note 2. To procure upon graduation a state teacher's certificate without examination, the student must elect during the junior and senior years from the Department of Psychology and Agricultural Education, not fewer than 20 hours (including those under Note 1) of such work as will meet the requirements of the State Board of Educational Examiners, these electives to be approved by the head of this department.

Note 3. The student, with the approval of the Dean of Agriculture and the head of this department, will select from these electives enough work to make a total of 16 to 20 hours.

Note 4. Those courses starred (*) are electives for women students.

Note 5. Students taking Home Economics electives will select during the senior and junior years, with the approval of the heads of the Departments of Home Economics and Agricultural Education, from page 147 of the courses in Home Economics and the prerequisites thereto, enough work to make a total of 16 to 20 hours each semester, which electives must finally include Home Economics 8, 22, 23, 35, 36, 37, and 38.

Note 6. Students electing the Home Economics studies are allowed to substitute Chemistry 22, 24, 58 and 59, for Chemistry 21, 23, 25 and 26, as prerequisites for certain work in Home Economics.

COURSE IN AGRICULTURAL EDUCATION

1. **General Principles of Teaching.** A course in those general principles upon which successful instruction, school management, methods, etc., are based. A text with supplemental texts for reference will be used. Three hours.

2. **General Principles of Teaching.** A continuation of course 1. Three hours.

3. **Principles of Secondary Education.** This course treats particularly of those principles that would prevail in high school, academy or other secondary school work wherein the students are of adolescent age. Two hours.

4. **Principles of Secondary Education.** A continuation of course 3. Two hours.

5. **Educational History.** A course in the History of Education, with special reference to its scientific and industrial phases. Two hours.

6. **Educational History.** A continuation of course 5. Two hours.

7. **General Methods.** A course in the underlying principles of methods of teaching. Two hours.

8. **Special Methods.** A course in methods especially adapted to the teaching of the sciences and industries. Two hours.

Department of Agricultural Journalism

CLIFFORD VERNE GREGORY, INSTRUCTOR

Six years ago a chair in Agricultural Journalism was established at the Iowa State College by the aid of Mr. John Clay, of the firm of Clay, Robinson & Co., of Chicago. This was distinctly a new departure in the field of agricultural education. By many agricultural journalism was looked upon as a field of labor of peculiar limitations, a field in which excellence could be obtained by heredity, but not by training or study. Mr. Clay, who is himself a most forcible writer, combining to a remarkable degree a wide range of practical information and a fascinating style, believed that training would count for something in this, as in all other lines of agricultural work. His address on "The Plow and the Book," delivered at Ames at the inception of this movement, has attracted wide attention.

The work, though started in a moderate way, has led to highly gratifying results. It has proven popular with the agricultural students, who have learned that there is great benefit to be derived from the study of this important subject. The graduates who have taken this work at Ames have given good account of themselves. A student who graduated four years ago immediately took a position on one of the leading agricultural papers. At the end of his first year's service his employer was pleased to contract with him for three years' service at a salary of \$2,500 for the third year. A student who graduated a year ago accepted a similar position on another paper and within a short time was advanced to an important editorial position on another paper of wide influence. One of the graduates in the class of 1908 was given an immediate position as associate editor on one of the leading western farm weeklies. A student in the 1909 class left school to accept a very attractive position as associate editor on one of the best farm papers in the East.

Not all students are qualified for editorial work, but all may be helped and strengthened by a good course in agricultural journalism, whether they intend to follow this calling or not. The ability to prepare a concise, readable article for publication is invaluable to the agricultural college graduate, no matter what line of work he intends to take up.

A man who has employed a number of Ames men for special work along this line said he had never yet been disappointed in one of them. An editor of a prominent agricultural paper, after passing on the work of one of the classes, said: "I don't think I need hesitate to say that I never got hold of nine articles that showed more uniform excellence, more care in preparation and observance of instruction received in the classroom."

In the Live Stock World reporting contest at the 1906 International, Ames men won three out of four prizes and one-half of the money offered. In the National Corn show contest in 1907, Ames students won thirty-

five out of sixty prizes and 68 per cent of the money offered, in competition with one hundred and fifty contestants from nine states. In the Iowa Corn Growers' contest in 1908, Ames students won first, second and third prizes and all of the money offered. All of these contests were based upon writing on practical subjects, with practical men as judges.

The work in agricultural journalism is proving that this subject has a place in the curriculum of a modern, well-equipped agricultural college, and in the education of the future farmer. The work not only stimulates a study of the essentials of agricultural journalism, but it admirably supplements a student's training in English, in clear, concise expression, and his knowledge of general agricultural topics.

1. **Beginning Journalism.** This course is a general introduction to the study of Agricultural Journalism. The subject is taken up mainly from the contributor's standpoint. The aim of the course is to teach the student to write concise, readable, newspaper English. A lecture is given every two weeks, the alternate lecture period being devoted to a study of the articles that have been written by the students. The student is required to hand in an assignment every two weeks. This is corrected and criticized from the editor's standpoint. This detailed, practical criticism does much to improve the writer's style. The lectures for this semester include the following subjects: "The Growth of Journalism," "The Place of Agricultural Journalism," "Style," "Preparing and Submitting Articles," "A Study of the Agricultural Press," "The Importance of Brevity and Conciseness," "Publicity," "Agricultural Reporting," "Writing in the Form of Notes." Prerequisites, all the required courses in English. One hour credit.

2. **Advanced Journalism.** This is a continuation of Course 1, special emphasis being given to the development of originality and literary excellence. The work is taken up in much the same manner as in the previous semester. A large share of the matter written by the students in this course is accepted for publication in the leading agricultural papers. The lectures include: "History of Journalism," "The Development of Individuality," "The selection of a Title," "The Value of Imagination," "Developing Originality," "Writing Feature Articles," "Writing for Special Issues," "Story Writing (from the standpoint of the agricultural papers)." During this semester several lectures are given to the class by men prominent in agricultural journalism. These lectures are invaluable in bringing the student into touch with the best agricultural papers and their needs. During the latter part of the semester a lecture is given by the Experiment Station Photographer, on "Photography in Its Relation to Journalism." Prerequisite, Journalism 1. One hour credit.

3. **Newspaper Management.** Courses 3 and 4 deal with actual management of an agricultural paper. They are taken up in connection with the student paper, the "Iowa Agriculturist." The Editor and Business Manager of this paper are elected by the Agricultural Club. In consultation with the Instructor in Agricultural Journalism, they choose

a staff, which includes so far as possible all the students who wish to take the course in Newspaper Management. This staff meets once each week with the Instructor in Agricultural Journalism to talk over matters relating to the management of the paper. The following are among the subjects taken up: "Editing MS," "Copy Reading," "Proof Reading," "The Make-Up of an Agricultural Paper," "Writing Editorials," "Reviewing Books and Bulletins," "Agricultural Advertising," "The Work of the Circulation Manager," "The Preparation of Special Issues." The Instructor in Journalism makes no attempt to dictate the policy of the paper, all matters of that nature being left to the Editor and Business Manager. Prerequisite, Journalism 1. With the consent of the instructor, students may take Journalism 1 and 3 at the same time. One hour credit.

4. **Newspaper Management.** A continuation of course 3. Prerequisite, Journalism 1. One hour credit.

Department of Home Economics

VIRGILIA PURMORT, PROFESSOR

CATHERINE J. MCKAY, ASSOCIATE PROFESSOR

GRACE ELMEDA RUSSELL, ASSISTANT PROFESSOR OF DOMESTIC ART

GRACE MEDORA VIALI, INSTRUCTOR

ETHEL MCDONALD, STUDENT ASSISTANT

NEALE S. KNOWLES, EXTENSION WORK

GERTRUDE N. ROWAN, EXTENSION WORK

The Department of Home Economics offers opportunity for scientific and practical work along the lines of Domestic Science and Domestic Art which are unexcelled in this country.

Woman stands exactly at the point where science most closely touches life. Young women entering upon college training for life responsibilities should be made keenly alive to the fact. It is the right of every young woman who is seeking an education and who expects to do her share of the world's work to have that education to fit her for her special work. It is to this end that the Department of Home Economics is working.

The educational world has and is providing well for the special types of education of men; professional, technical and commercial, which are fitting men for greater proficiency, and greater earning capacity.

It is man's place to provide for the family, woman's work to use the funds provided to secure the best in all lines of expenditure; food, clothing, home furnishings and materials for household maintenance. It is her task to wisely administer the home with well defined economic, scientific, artistic and ethical standards.

Woman's education in the majority of schools has been limited to cultural and disciplinary subjects. Upon the completion of such courses, she had been forced to meet the vital affairs of her life with merely academic training.

That woman's truest sphere of usefulness and therefore greatest joy in living is within the realm of home and its interest, few will contradict. That the average woman is at all times responsible for her own physical well being and nine times out of ten for the physical, moral and mental well being of others dependent upon her as wife and mother, none can deny. Does not such an evident responsibility demand a scientific knowledge of the values of the foods she purchases and prepares for those dependant upon her, those for whose growth and health she is directly responsible? Should she not be able to apply the principles of sanitation to her own house and also to her city? For the clean and unclean condition of any town reacts immediately upon the health of its households.

The course in Home Economics meets a great need, higher education for women, which will apply to the every-day affairs of life. The object of the course is first to teach the proper administration of the home, and with it, to prepare all students who desire to teach the subject of Home Economics. The positions which students graduating in the course of Home Economics are fitted to fill are those of teaching in the public schools of all grades, dietitian work in Hospitals and other institutions, institutional house-keeping, etc. The field of work is unlimited, the demand for college technical women is far greater than can be supplied. No other calling for women presents the human interest and the broad outlook that is found in the Home Economics.

THE HOME ECONOMICS BUILDING

The new Home Economics building completed in January, was erected at a cost of \$75,000.00. There is but one other Home Economics building in the United States which compares with it in beauty and completeness in every detail. The building is of red compressed brick and fire proof structure. It is north of Margaret Hall and faces the north. The ultimate plan is to join the building to Margaret Hall by the addition of two wings, leaving an open court in the center.

On the ground floors are six class-rooms; a large reading room, locker rooms and the laundry. The first floor is occupied by the Domestic Art Division, three large well lighted sewing rooms and fitting rooms with provision for dyeing and pressing. The Home Nursing Demonstration room and the general and private offices are on this floor.

On the second floor are the Domestic Science rooms, three large kitchens finished in white tile, marble and enamel, accommodating twenty students each, large pantries, two dining rooms, a home kitchen, and dining room in which individual work may be done, two large rooms for the Applied Design, a rest room and reception room. Large and beautiful halls run the length of the building on each floor. The heating is both direct and indirect radiation, the entire amount of air in the building is changed every few minutes, thus providing perfect ventilation. The entire building is being furnished and equipped from the standpoint of utility, simplicity and beauty. It offers to the young woman of the state of Iowa

opportunity which few states have offered their daughters. With this excellent home equipment the Department of Home Economics is unhandicapped in meeting the demands of years to come.

COURSE OF STUDY

Freshman Year

FIRST SEMESTER

		Required Semester Hours
Home Economics 1,	Sewing	2½
Home Economics 41,	Personal Sanitation and Hygiene	R
Botany 61,	Morphology	1½
Chemistry 22,	General Chemistry	4½
English 11,	Exposition	3
Mathematics 4,	College Algebra	5
Physical Culture 1,	Marching Tactics	R
		—
	Total hours required	16½
Electives to be selected from Junior College Electives on page 136,		1½ to 3½
		— —
		18 to 20

These electives, if selected, are to be added to the required hours and cannot be afterwards transferred to any other semester.

SECOND SEMESTER

		Required Semester Hours
Home Economics 4,	Sewing	2½
Botany 68,	Plant Physiology	3½
Chemistry 24,	Qualitative Chemistry	4½
English 10,	Narration and Description	3
Choice {	History 3,	3
	The West in American History	
	Mathematics 30,	
Physical Culture 2,	Plane Trigonometry	R
	Calisthenics	R
		—
	Total hours required	16
Electives to be selected from Junior College Electives on page 136,		2 to 4
		— —
		18 to 20

These electives, if selected, are to be added to the required hours and cannot be afterwards transferred to any other semester.

Sophomore Year**THIRD SEMESTER**

		Required Semester Hours
Home Economics 43,	Food Preparation	2½
Home Economics 37,	Home Sanitation	2
Home Economics 50,	Applied Design	1½
*Chemistry 58,	Organic Chemistry	4½
English 12,	Argumentation	2
Physics 301,	Mechanics and Heat	3
Physical Culture 3,	Light Apparatus	R
		—
		15
Electives:	From page 136	3 to 5
		—
	Total hours required	18 to 20

FOURTH SEMESTER

		Required Semester Hours
Home Economics 44,	Food Preparation	2½
Home Economics 51,	Applied Design, Theory of Design	1½
*Chemistry 59,	Food Analysis	4½
Physical Culture 4,	Swedish Gymnastics	R
Physics 402,	General Physics	3
Zoology 16,	General Zoology	4½
		—
		15½
Electives:	Page 136	2½ to 4½
		—
	Total hours required	18 to 20

* Class of 1914 will take Chemistry 24 and 58 instead of Chemistry 58 and 59.

DOMESTIC SCIENCE GROUP**Junior Year**

Note—Home Economics Students who expect to teach should elect Psychology 7 and 8 in order to receive the special State Certificate upon graduation.

FIFTH SEMESTER

		Required Semester Hours
Home Economics 48,	Cookery	2
Bacteriology 2,	General Bacteriology	1½
Chemistry 60,	Physiological Chemistry	3½
Zoology 12,	Human Physiology	4½
		—
		11½

Electives:	Enough work will be selected from the Senior College electives on page 275 to make	4 $\frac{2}{3}$ to 6 $\frac{1}{3}$
Total semester hours required		16 to 20

SIXTH SEMESTER

		Required Semester Hours
Home Economics 42,	Textiles and their Care	2 $\frac{1}{3}$
Home Economics 49,	Cookery	2
Bacteriology 3,	Fermentation	1 $\frac{1}{3}$
Zoology 13,	Human Physiology	4 $\frac{1}{3}$
		—
		10 $\frac{1}{3}$
Electives to be selected from page 275,		5 $\frac{2}{3}$ to 7 $\frac{1}{3}$
		—
Total semester hours required		16 to 20

Senior Year

SEVENTH SEMESTER

		Required Semester Hours
Home Economics 27,	Household Accounts	2 $\frac{1}{3}$
Public Speaking 15,	Extempore Speech in Home Economics	2
Home Economics 45,	Food and Dietetics	3
Home Economics 9,	Theory of Teaching Domestic Science	1 $\frac{2}{3}$
Home Economics 11,	History of Art	2
		—
		9 $\frac{1}{3}$
Electives to be selected from page 275		6 $\frac{2}{3}$ to 10 $\frac{2}{3}$
		—
Total hours required		16 to 20

If Agricultural Journalism is elected in this semester the student will be required to take Agricultural Journalism 2 or 4 as an elective, in the eighth semester.

EIGHTH SEMESTER

		Required Semester Hours
Home Economics 10,	Theory and Practice of Teaching Domestic Science	1 $\frac{1}{3}$
Home Economics 12,	History of Art	2
Home Economics 30,	Food Production and Commercial Distribution	1
Home Economics 46,	Food and Dietetics	3

Home Economics 47,	Home Management	1
Home Economics 53,	Interior Decoration and House	
	Furnishing	1½
*English 13,	Advanced Composition	2
		—
		12
For electives see page 275		4 to 8
		—
	Total hours required	16 to 20

Horticulture 11 elective in Senior year.

* If Agricultural Journalism is elected through the seventh and eighth semesters, the student may drop English 13 and take two hours elective in its place.

DOMESTIC ART GROUP

Junior Year

Note—Home Economics Students who expect to teach should elect Psychology 7 and 8 in order to receive the special State Certificate upon graduation.

FIFTH SEMESTER

		Required Semester Hours
Home Economics 6,	Dress Making	2½
Bacteriology 2,	General Bacteriology	1½
*Chemistry 61,	Chemistry of Textiles	3½
Zoology 12,	Human Physiology	4½
		—
		11½
Electives to be selected from page 275,		4½ to 8½
		—
	Total semester hours	16 to 20

* Class of 1914 will take Chemistry 59 instead of 60 in fifth semester of D. S. group and Chemistry 59 instead of 61 in D. A. group.

SIXTH SEMESTER

		Required Semester Hours
Home Economics 7,	Dressmaking	2½
Home Economics 42,	Textiles and their Care	2½
Home Economics 52,	Costume Design	1½
Bacteriology 3,	Fermentation	1½
Zoology 13,	Human Physiology	4½
		—
		12
Electives to be selected from page 275,		4 to 8
		—
	Total semester hours	16 to 20

* Class of 1914 will take Chemistry 59 instead of 60 in fifth semester of D. S. group and Chemistry 59 instead of 61 in D. A. group.

Senior Year**SEVENTH SEMESTER**

		Required Semester Hours.
Home Economics 11,	History of Art	2
Home Economics 14,	Theory and Practice of Teach- ing Domestic Art	1½
Home Economics 33,	Advanced Dress Making	2
Home Economics 34,	Advanced Course in Textiles	1½
Home Economics 54,	Textile Design	¾
Public Speaking 15,	Extempore Speech in Home Economics	2
		—
		9¾
*Electives to be selected from page 275,		6½ to 10½
		—
	Total semester hours	16 to 20

* If Agricultural Journalism is elected in this semester the student will be required to take Agricultural Journalism 2 or 4 as an elective in the eighth semester.

EIGHTH SEMESTER

		Required Semester Hours.
Home Economics 12,	History of Art	2
Home Economics 32,	Theory and Practice of Teach- ing Domestic Art	1½
Home Economics 35,	Millinery	1½
Home Economics 53,	Interior Decoration and Household Furnishing	1½
*English 13,		2
		—
		8½
Electives to be selected from page 275,		7¾ to 11¾
		—
	Total semester hours	16 to 20

* If Agricultural Journalism is elected through the seventh and eighth semesters, the student may drop English 13 and take two elective hours in its place.

Junior College Electives

Subjects which may be elected in the Freshman and Sophomore years in the Domestic Economy Course and which are called Junior College electives.

(The number in the parenthesis indicates the number of hours' credit.)

Botany 4 (5), 12 (4), 15 (3 or 5), 28 (5).

Civil Engineering 308 (4).

Dairying 10 (2).

Home Economics 1 (2½), 4 (2½), 37 (2), 42 (2), 43 (2½), 44 (2½),
47 (1), 50 (1½), 51 (1½).

Economic Science 9 (3), 16 (3).

English 13 (2).

History 5 (3), 6 (3).

Horticulture 8 (2), 31 ($\frac{2}{3}$), 34 ($2\frac{2}{3}$), 35 (1).

Languages 1 (5), 2 (5), 3 (3), 4 (3), 5 (5), 5a (3), 6 (5), 6a (3), 7 (3), 8 (3), 16 (3), 17 (3), 18 (3), 19 (3), 20 (3), 21 (3), 24 (3), 25 (3), 27 (3), 28 (3), 30 (5), 31 (5), 32 (5), 36 (3), 40 (2), 41 (2), 51 (3), 53 (3).

Literature 1 (3), 2 (5), 5 (5), 8 (2), 10 (3), 11 (2).

Mathematics 8 (5), 9 (5), 223 ($2\frac{1}{2}$), 324 (2), 325 (3), 426 (5).

Psychology 7 (3), 8 (3), 10 (2).

Public Speaking 2 (1), 3 (2).

Zoology 5 (3), 7 (5), 14 (3), 17 (3).

Senior College Electives

Note—The list of electives for Junior and Senior Classes in Home Economics Course will be found by referring to the list of electives found on page 275, under the heading of Senior College Electives, Science Division.

COURSES IN HOME ECONOMICS

Domestic Art

1. **Sewing.** This course includes drafting of patterns and hand sewing, including the different kinds of stitches, darning, patching, the making of button holes, etc., all of which will be applied to some useful garment. One recitation. Two-hour laboratories. Two and one-third hours' credit. Fee, \$1.00.

4. **Sewing.** More advanced drafting, hand and machine sewing, silk skirts, slips or tailored skirts and tailored waists will be made. Economical cutting of material, fitting of garments, and choice of materials will be discussed from the stand point of economy and beauty. Prerequisite, Home Economics 1, one recitation, two-hour laboratories. Two and one-third hours' credit. Fee \$1.00.

6. **Dressmaknig.** This course includes the designing of patterns and the making of fancy waists. In this course the students will be allowed, aside from the fancy waists, to make some garment that will be especially useful to them along the line of wearing apparel. Special emphasis is given to the artistic side of the work and the history of costume. Prerequisite, Home Economics. One recitation and two-hour laboratories. Two and one-third hours' credit. Fee, \$1.00.

7. **Dressmaking.** This course is the continuation of Home Economics 6. The advanced work in sewing will be the making of a thin unlined dress. Lessons will be given of the making of girdles and ribbon bows and other methods of work suitable for trimming purposes. Prerequisites, Home Economics 6 and Applied Design. One recitation, two-hour laboratories. Two and one-third hours' credit. Fee, \$1.00.

42. **Textiles and Their Care.** This course takes up the study of

fabrics, also the evolution of spinning and weaving from their beginnings in primitive life to the present day. Laboratory work will include laundering, dyeing, of cotton, wool, silk and linen, simple weaving, and other work especially suitable for textiles in the home. Prerequisite, Applied Design 50, one recitation and 2 two-hour laboratories, credit, two and one-third hours.

14. Theory and Practice of Teaching Domestic Art. This course considers the place of Domestic Art in education, its relation to various subjects in the curriculum; it deals with the outlines for courses of domestic art in various types of schools, furnishing and equipping of departments, development of lesson plans, collection and use of illustrated materials. The practical work is practice teaching and assisting in classes of school girls. Prerequisite course 7. Recitation 1 hour, laboratory two hours. One and two-third hours' credit. Fee, \$3.00.

32. Theory and Practice of Teaching Domestic Art. Continuation of course 14. Prerequisite, course 14. Recitation, one hour, laboratory, two hours. One and two-thirds hours' credit. Fee, \$3.00.

33. Advanced Dress Making. This work includes elaborate work in costume pattern designing and the making of a street, house and evening gown. Prerequisite, Home Economics 7, and Design 52. Three two-hour laboratories. Two hours' credit. Fee, \$1.00.

34. Advanced Course in Textiles. In this course the work in applied Design 54 will be put into practice in loom weaving, basket making, embroidering, crocheting, and knitting. This course is especially helpful to those wishing to teach in High Schools, Normals and Colleges. Prerequisite, course 42. Two two-hour laboratories. One and one-third hours' credit. Fee, \$3.00.

42. Textiles and Their Care. This course takes up the study of fabrics, also the evolution of spinning and weaving from their beginnings in primitive life to the present day. Laboratory work will include laundering, dyeing of cotton, wool, silk and linen, simple weaving, and other work especially suitable for textiles in the home. Prerequisite, Applied Design 50. One recitation and two two-hour laboratories. Two and one-third hours' credit. Fee, \$2.00.

50. Applied Design. History of Ornament. In this course the study of historic and architectural ornament is taken up, including the Egyptian, Greek, Roman, Byzantine, Gothic and Renaissance styles. The object is to develop within the student a quick appreciation of these as they are met at the present time. Two two-hour laboratories. One and one-third hours' credit. Fee, \$1.00.

51. Theory of Design. A study of the Theory of Design, color analysis, tone value, principles of harmony, rhythm, balance, embroidering, subordination, etc. These principles are first applied in simple problems, borders and surface designs, and later executed for such purposes as book covers, rugs, wood block prints, and stencils. Metal and leather are also used in the making of useful articles. Prerequisite, course 50. One and one-third hours' credit. Fee, \$2.00.

53. **Interior Decoration and Household Furnishing.** This course is a practical one dealing with the decoration and furnishing of the entire home. Problems of artistic and economic furnishings, and costs of material and labor will be discussed. Practical work in designing will be given which can be applied directly to the furnishing of a home. Two two-hour laboratories. One and one-third hours' credit. Fee, \$1.00.

54. Special work in the making of designs which will be executed in the weaving of baskets, embroidering of linen, loom weaving of rugs, etc., in course 34. One two-hour laboratory. Two-thirds hours' credit. Fee, \$1.00.

11. **History of Art.** This course first deals with the subjects of architecture and sculpture. A detailed study of organic and typical styles of architecture, a description of the great masterpieces of each style and period, and a consideration of present day architecture in America. Sculpture is treated as an adjunct to architecture. The history of painting is there entered upon. A study of the schools and masters of different countries from early Italian to the present time. Giotto and his school, the art of the Renaissance, Venetian painting, Spanish, Dutch, English and American art, and modern art movements. Two hours' recitation. Two hours credit.

12. **A Continuation of Course 11.** Two hours' recitation. Two hours' credit.

35. **Millinery.** One and one-third hours' credit.

52. **Costume Design.** Two laboratories. One and one-third hours' credit. Fee \$1.00.

DOMESTIC SCIENCE

9. **Theory and Practice of Teaching Domestic Science.** Treats of the purpose of Domestic Science in education and deals with the methods of teaching it in schools of all grades; its relation to other subjects in the curriculum, planning of courses and presentation of lessons; management and care of departments. Recitation one hour and laboratory one period per week. Credit, one and two-thirds hours. Prerequisite H. Ec. 48. Fee, \$3.00.

10. **Theory and Practice of Teaching Domestic Science.** A continuation of course 9. Plans for furnishing and equipping laboratories at various costs. The laboratory work consists of practice teaching, of school classes, assisting and observing. Prerequisite 46. One and two-thirds hours' credit. Recitation, one hour, and laboratory, one period per week. Fee, \$3.00.

27. **Household Accounts.** This course presents business methods and forms which all women should know—banking, renting, forms of contracts, etc. Systems of household bookkeeping will be discussed and household and personal accounts kept. Two-thirds hours' credit. One laboratory per week.

37. **House Structure and Sanitation.** Study of location and surroundings of the house, house plans and comparative values of various building materials, types of house architecture, architect's specifications,

heating, lighting and ventilation, private and public systems of disposal of wastewater supplies, refrigeration, care of the house, cleaning and repairing. Two hours' credit. Recitation, two hours per week.

41. **Personal Sanitation and Hygiene.** A lecture course upon the sanitary care of the person, clothing and surroundings, discussion of social and ethical questions which arise in community and college life.

43. **Food Preparation.** This course introduces the subject of foods and food preparation in its scientific and economic aspect. It is the study of the nutritive principles as they are found in various foods and the methods of cooking foods to retain those principles in digestible form; serving of foods in simple and attractive form. Economy of money, time and labor being the watchword. One recitation and two two-hour laboratories per week. Prerequisite, Chem. 22. Two and one-third hours' credit. Fee, \$4.00.

44. **Food Preparation.** A continuation of 43. Two and one-third hours' credit.

45. **Food and Dietetics.** This course includes a thorough and scientific study of food materials in their relation to the daily dietary of families under various conditions of health and environment. Also takes up institutional dietaries; the relation of dietetics to various diseases; the feeding of children. The practical work in this course in advanced cookery, therapeutic cookery, and the preparation of actual meals according to various dietary standards. Prerequisite, courses 43, 44, 48 and 49. Fee, \$7.00. Three hours' credit.

46. **Food and Dietetics.** Continuation of course 45. Three hours' credit.

47. **Home Management** { a. **Distribution of Income.**
b. **Home Nursing.**

a. This course is composed of lectures upon the principles of art and decoration in their application to home furnishing and every day living; interior mural decoration, floors, furniture, household linens, china, cutlery, silver and pottery are taken up from the standpoint of color combination and beauty of line as well as utility and economy.

b. Study of the scientific care of the patient under home conditions, including the furnishing, temperature and ventilation of the room, bathing, dressing and administering food and medicine to patients, bed making, bandaging, lifting helpless patients, preparation and application of fomentations. This lecture and demonstration work is given in connection with the invalid cookery work in course 46. One hour credit.

48. **Cookery.** A continuation of course 43 and 44 dealing with the practical administration of the home table. Planning, marketing and serving of meals. One laboratory per week, credit one hour. Fee, \$3.00.

49. **Cookery.** Continuation of course 48. —laboratory hours. Two hours' credit. Fee, \$3.00.

30. **Food Production and Commercial Distribution.** This course consists of lectures upon the staple foods, their production, manufacture and distribution from the raw material to the finished product. Discussions of the composition and the cost of food materials, the process

of preservation of foods, such as canning and preserving of foods, salting, smoking, drying, use of preservatives, adulteration and substitution. Also a resume of the state and national laws governing the distribution of food. Recitation, one hour. One hours' credit.

ELECTIVES IN THE AGRICULTURAL COURSES

Subjects which may be elected in the Junior or Senior Year in any of the Agricultural courses, provided the student has the prerequisites for each study chosen:

Semester. Department. Course Numbers, and Hours.

First Agricultural Chemistry 27 (3), 40 (4).

Second Agricultural Chemistry 26 (4), 34 (5), 56 (5).

First Agricultural Engineering 3 ($3\frac{1}{3}$), 4 ($3\frac{2}{3}$), 7 ($1\frac{2}{3}$), 9 (2), 13 (2).

Second Agricultural Engineering 5 ($2\frac{2}{3}$), 6 (3), 8 (1), 9 (2), 13 (2), 21 (1).

First Agricultural Journalism 1 (1), 3 (1).

Second Agricultural Journalism 2 (1), 4 (1).

First Animal Husbandry 9 (2), 11 (2), 20 (2), 21 (2), 30 ($2\frac{2}{3}$), 31 ($2\frac{2}{3}$), 32 (1), 35 (1), 38 (1), 41 (2).

Second Animal Husbandry 7 (2), 12 (2), 33 (1), 34 (1), 36 (1), 39 (1), 42 (2).

First Bacteriology 1 (4).

Second Bacteriology 1 (4), 5 (4).

First Botany 4 (5), 5 (3 or 5), 13 (2), 19 (2), 60 (2).

Second Botany 11 (4), 12 (4), 15 (3), 23 (1 to 5), 25 (2), 36 (4).

First Civil Engineering 308 (4).

Second Civil Engineering 409 (4), 713 (2).

First Dairying 14 ($3\frac{1}{3}$), 17 (4), 26 (1).

Second Dairying 10 (2), 11 (3), 13 ($1\frac{2}{3}$), 16 (1), 20 ($3\frac{1}{3}$), 21 ($1\frac{2}{3}$), 24 ($2\frac{1}{3}$), 25 (3), 27 (1).

First Economic Science 1 (5), 3 (3), 7 (2), 9 (3), 13 (1), 17 (2), 19 (2), 22 (3).

Second Economic Science 4 (2), 5 (3), 6 (2), 10 (3), 11 (2), 20 (1), 21 (2).

First English 7 (1), 13 (2).

Second English 8 (1).

First Farm Crops 3 (2), 8 (3), 10 (2), 11 (1), 21 ($1\frac{1}{3}$).

Second Farm Crops 4 ($1\frac{2}{3}$), 10 (2), 12 ($1\frac{2}{3}$) 18 (5) 17 (2).

First Forestry 2 (2), 4 (2), 5 (2), 9 (2), 11 (1), 12 (2), 19 ($\frac{1}{2}$).

Second Forestry 3 (2), 6 (1), 10 (2), 14 ($1\frac{2}{3}$), 16 (1), 17 (2), 18 ($\frac{1}{2}$), 19 ($\frac{1}{2}$).

First Geology 10 (4).

Second Geology 607 (4), 805 (4), 2 (4), 6 (4), 9 (2).

First History 3 (3), 5 (3), 10 (2), 12 (2), 22 (2).

Second History 4 (3), 5 (3), 6 (3), 9 (2), 11 (2), 20 (2), 21 (2).

First	Horticulture 4 ($2\frac{2}{3}$), 5 ($2\frac{2}{3}$), 8 (2), 9 (2), 28 ($\frac{1}{2}$), 29 ($\frac{1}{2}$), 30 ($\frac{2}{3}$), 33 ($\frac{2}{3}$).
Second	Horticulture 10 (2), 31 ($\frac{2}{3}$), 32 ($\frac{2}{3}$).
First	Modern Languages:
	Language (French) 1 (5), 3 (3).
	Language (German) 5 (5), 16 (3).
	Language (Spanish) 30 (5).
Second	Modern Languages:
	Language (French) 2 (5), 4 (3).
	Language (German) 6 (5), 17 (3).
	Language (Spanish) 31 (5).
First	Literature 1 (3), 4 (3), 6 (2), 8 (2).
Second	Literature 2 (5), 3 (3), 5 (5), 7 (2), 10 (3), 11 (2), 13 (2), 14 (2).
First	Mathematics 8 (5), 324 (2), 325 (3).
Second	Mathematics 9 (5), 223 ($2\frac{1}{2}$), 426 (5).
First	Military 5 (1), 7 (1).
Second	Military 6 (1), 8 (1).
First	Physics 509 (2).
Second	Physics 404 (5).
First	Psychology 5 (3), 6 (2), 7 (3), 9 (2), 10 (2).
Second	Psychology 2 (3), 3 (3), 4 (3), 5 (3), 6 (3), 8 (3), 9 (2).
First	Public Speaking 3 (2), 5 (2), 10 (2), 16 (2), 17 (1).
Second	Public Speaking 4 (2), 6 (2), 8 (1), 11 (2), 18 (1).
First	Soils 1 (4), 4 (2), 6 (2), 8 (4), 13 ($1\frac{1}{2}$).
Second	Soils 2 (4), 3 (2), 7 (1), 14 (3), 15 (2), 16 (2).
First	Veterinary 19 (1), 23 (2), 33 (3), 44 (2).
Second	Veterinary 22 (2), 24 (2).
First	Zoology 2 (5), 4 (4), 5 (3 or 5), 10 (3 or 5), 18 (2).
Second	Zoology 3 (5), 6 (1), 8 (2), 10 (3 or 5), 17 (3).

Remunerative and Instructive Labor

The Agricultural Courses afford opportunity to do considerable work in the fields and about the barns and grounds. The compensation for services of this kind ranges from eight to fifteen cents per hour according to the merit of the work. Thus students are enabled not only to earn part of their expenses but also to materially strengthen the practical side of their education. A number of the strongest and most capable students are aided in finding employment during vacations with successful stockmen on good farms and in various other positions in line with their chosen work. Some who have taken a year of practical work in this way during their course have found it of marked benefit, and it has enabled them to command more desirable and remunerative positions at the completion of their College course. Too much emphasis cannot be placed on a thorough understanding of the practical application of correct principles of agriculture.

Credits for Practical Work

Agricultural students who, by previous agreement with the head of the department, do practical work on farms, horticultural or feeding or breeding establishments, beet sugar factories or forestry reservations, of recognized standing, during their course of study will be allowed credits on the following basis: Students who take practical work of the kind described under the direction of the proprietor and render competent and faithful service, will, on their return to College and on the presentation of a concise written report or resume of their observations and experience, be entitled to the following credits in the four-year courses in Agriculture:

For three months, five hours of elective work in the Junior or Senior year; for six months, eight hours; and for one year, ten hours; no more than five hours of which shall be credited in any one term of the College course.

Students must have at least six months of practical work before graduation, but credit will be given for such work only as stated above.

Department of Agricultural Scholarships

The State Department of Agriculture offers scholarship prizes in this institution amounting to \$1,000. These scholarships are awarded at the Iowa State Fair, based upon boys' stock and grain judging contests and girls' cooking contests. There are five scholarships for boys, ranging from \$200 to \$25, and four for girls, ranging from \$100 to \$25. The winners of the contest receive the money in monthly installments during the year of college work, with the exception of the \$25 scholarship which applies upon the two weeks short course. These scholarships offer opportunities for young men and women to receive substantial aid toward paying the expenses of a college education and many excellent students have come to the institution by this means.

Armour Scholarships

Mr. J. Ogden Armour of Chicago has donated \$5,000 annually for scholarships at the International Live Stock Exposition. The award of these scholarships is based upon the competition of the students and stock exhibits of the various agricultural colleges. The Iowa State College has been fortunate in winning more than twice as many of these as any other institution, and about \$5,000 worth of scholarships have been awarded to worthy farm boys of Iowa who are dependent upon their own resources in obtaining a college education. These scholarships of \$250 each are awarded annually at the close of the two weeks' short course held in January and the award is based upon a competitive examination in stock and grain judging.

The Clay, Robinson & Company Fellowship

Since the organization of the International Live Stock Exposition, Clay, Robinson & Company of Chicago have offered \$1,000 annually to be competed for by the various Agricultural Colleges in their live stock exhibits at the International. This institution has always won a large share of these premiums and the funds have been used to provide for a fellowship in Agriculture to aid worthy students in advanced study. These fellowships have materially aided young men to make a better and more thorough preparation for Agricultural teaching and investigation and for practical work on the farm.

For further information about any of the scholarships or fellowships address the Dean of Agriculture.

Agricultural Short Courses

CHARLES FRANKLIN CURTISS, DEAN

TWO YEAR COURSE IN AGRICULTURE

The two year course in agriculture is offered in order to meet the demand of young men who have not had the advantages of high school training, and who wish to obtain such preparation for practical agricultural work, as a two year course will afford. The work offered in this course is naturally of lower grade than the collegiate work and will have special application to practical problems in agriculture, in its various phases.

Calendar

1911

FIRST SEMESTER

September 1-2, Friday, 8:00 A. M. to Saturday, 5:00 P. M. Registration-Classification Days.

December 20, Wednesday, 5:00 P. M. College Work closes.

1912

SECOND SEMESTER

January 18-20, Thursday, 1:30 P. M. to Saturday, 5:00 P. M. Registration-Classification Days.

June 7, Friday. Summer Vacation begins.

REQUIREMENTS FOR ADMISSION

Any student desiring to enter this course must be, at least, seventeen years of age, and must present a certificate showing that he has satisfactorily completed the eighth grade of the public school. This certificate must give full and complete high school or academic record of the applicant, and must be signed by the superintendent or principal. All applications for admission should be addressed to the *Registrar, Iowa State College*, who will furnish the proper blanks. These certificates should be filed with the *Registrar* as promptly as possible, and, at least, two weeks before the opening of the semester.

High School graduates who are able to meet the entrance require-

ments of the collegiate courses in Agriculture will not be eligible to this course.

FEES AND EXPENSES

The entire expenses of a student need not exceed \$300.00 per College year.

Tuition. No charge for tuition is made to the students from the State of Iowa. To the non-residents, a tuition fee of \$50.00 per year is charged.

Incidental Fee. The regular incidental fee for the semester is \$10.00, but all students who classify during the classification period, Thursday, Friday and Saturday, before College work begins, will be charged only \$8.00 per semester.

Laboratory Fees. Laboratory fees at the actual cost of breakage and usage are charged to the students, the Treasurer's receipt for such fees being required before the students are admitted to laboratories. For the amount of the fee in any course the student should refer to the description of courses, under the department in which the course is taught.

Board and Room. Students can secure furnished rooms and board in clubs or private families adjacent to the College grounds at from \$3.50 to \$5.00 per week.

The College Custodian, office in old office building, should be consulted by all new students, concerning rooms and rooming places, that undesirable rooms and houses may be avoided. For sanitary or any other reasons the College authorities reserve the right to forbid students from rooming in any particular house.

Hospital Fee. All students living in College buildings, and such others as desire to do so, pay a Hospital fee of \$2.50 per semester.

Text Books. All text books and stationery may be purchased at the College Book Store at about 20 per cent below the average retail price.

TWO YEAR COURSE IN AGRICULTURE

FIRST YEAR

First Semester

	Credits
Agricultural Engineering A1, Blacksmithing	
or	
Agricultural Engineering A2, Carpentry	1½
Animal Husbandry A1, Market Types of Cattle and Sheep	2
Animal Husbandry A5, Feeding and Management of	
Live Stock	1½
Farm Crops A1, Corn	2½
Horticulture A3, Fruit Growing	1½
Botany A1, Agricultural Botany	2

Chemistry A57,	Elementary Chemistry	2
Veterinary A1,	Sanitary Science and Obstetrics	3
English A14,	Letters and Themes	3
Total		<hr/> 19 $\frac{1}{3}$

Second Semester

Agricultural Engineering A1,	Blacksmithing	
or		
Agricultural Engineering A2,	Carpentry	1 $\frac{1}{3}$
Agricultural Engineering A4,	Field Engineering	2
Animal Husbandry A2,	Market Types of Dairy Cattle,	
	Horses and Swine	2
Animal Husbandry A6,	Feeding and Management of	
	Live Stock	1 $\frac{2}{3}$
Farm Crops A2,	Small Grains	2 $\frac{2}{3}$
Horticulture A14,	Farm Forestry	1
Botany A2,	Farm Weeds and Seeds	2
Zoology A30,	General Zoology	2
English A15,	Letters and Themes	3
Total		<hr/> 17 $\frac{2}{3}$

SECOND YEAR**Third Semester**

		Credits
Agricultural Engineering A5,	Farm Machinery and Farm Motors	2 $\frac{2}{3}$
Animal Husbandry A3,	Breed Types of Cattle and Sheep	3 $\frac{1}{3}$
Dairying A12,	Principles of Dairying	2 $\frac{2}{3}$
Farm Crops A4,	Farm Management	2
Soils A1,	Soil Physics	3
Zoology A31,	Entomology	2
Economic Science A22,	Rural Economics	2
Total		<hr/> 17 $\frac{2}{3}$

Fourth Semester

Agricultural Engineering A6,	Farm Buildings	2
Animal Husbandry A4,	Breed Types of Dairy Cattle,	
	Horses and Swine	3 $\frac{1}{3}$
Animal Husbandry A7,	Animal Breeding, Feeding and	
	Herdbook Study	3
Animal Husbandry A8,	Poultry Management	2 $\frac{2}{3}$
Farm Crops A3,	Forage and Pasture Crops	2
Soils A2,	Soils and Fertilizing Materials	3
Horticulture A2,	Plant Propagation	2
Total		<hr/> 18

OPTIONAL STUDIES IN THE TWO YEAR COURSE IN AGRICULTURE

With the consent of the Dean of Agriculture, students having the prerequisite preparation, may elect subjects from the following list, in place of any study named in the above semester schedules, provided they have the equivalent of two and a half years of high school work, or have passed up in advance part of the required work scheduled. Two year students may take an additional course in English in the second year with the approval of the Dean.

Course	Name of Subject	Hours Credit
Economic Science A15	Government in State and Nation	3
English A1	Grammar	5
English A2	Rhetoric and Composition	5
History A1	English History	5
History A2	Advanced American	4
History A16	National Period	3
Literature A12	English Classics	4
Mathematics A1	Algebra	5
Mathematics A2	Algebra	5
Mathematics A3	Algebra Review	5
Mathematics A5	Plane Geometry	5
Public Speaking A2	Declamation	1

AGRONOMY

Soils A1. Soil Physics. Third Semester. Physical and chemical condition of soils, seed beds, draining, plowing, harrowing, cultivating, rolling mulches, and soil management. Lectures two hours, laboratory lectures and demonstrations two hours, per week. Three hours credit. Fee, \$1.00.

Soils A2. Soils and Fertilizing Materials. Fourth Semester. Improvement of soils; soil organisms, fertility, organic compounds, plant food, by fertilizers; manures, crop rotations. Sandy, arid, alkali, acid, peat, and gumbo soils. Lectures two hours, laboratory lectures and demonstrations two hours, per week. Three hours credit. Fee, \$1.50.

Farm Crops A1. Corn. First Semester. Corn production, seed ears, storing, testing, grading, planting, cultivating, and harvesting. Corn breeding, different varieties, growth, cost of production, marketing, and uses. Two lectures and one two-hour laboratory period per week. Two and two-thirds hours credit. Fee, \$1.50.

Farm Crops A2. Small Grains. Second Semester. Varieties of soil, climate, preparation of the seed bed, seeding, harvesting, cost of production, uses, etc. Score card practice and commercial grading. Two lectures and one two-hour laboratory period per week. Two and two-thirds hours' credit. Fee, \$1.50.

Farm Crops A3. Forage and Pasture Crops. Fourth Semester. Varieties, soiling crops, pastures; habit of growth, adaptation, palatability, and composition; seeding, handling, harvesting, etc. Two lectures per week. Two hours credit.

Farm Crops A4. Farm Management. Third Semester. Farm management, rotations, special crops, buildings, labor and marketing. Specialized and general farming. Farm accounts. Two lectures and one two-hour laboratory and lecture period per week. Three hours' credit. Fee, \$2.00.

DAIRYING

A12. Principles of Dairying. Third Semester. Secretion and composition of milk, hand separators, testing dairy products, care of milk and cream, on the farm, butter and cheesemaking on the farm, are all subjects; creamery problems. Recitation two hours, laboratory two hours, per week. Two and two-thirds hours' credit. Fee, \$3.00.

ANIMAL HUSBANDRY

A1. Judging Market Types of Cattle and Sheep. First Semester. Two two-hour judging periods per week. Two hours' credit. Fee, \$2.00.

A2. Judging Market Types of Dairy Cattle, Horses and Swine. Second Semester. Two two-hour judging periods per week. Two hours' credit. Fee, \$2.00.

A3. Breed Types of Cattle and Sheep. Third Semester. Judging according to official standards. Origin, history, characteristics, and adaptability to climate and soil. Prerequisite, Animal Husbandry A1. Lectures two hours and two two-hour judging periods per week. Three and one-third hours credit. Fee, \$2.00.

A4. Breed Types of Dairy Cattle, Horses and Swine. Fourth Semester. Judging according to official standards. Origin, history, characteristics, and adaptability to climate and soil. Prerequisite, Animal Husbandry A2. Lectures two hours and two two-hour judging periods per week. Three and one-third hours credit. Fee, \$2.00.

A5. Feeding, Care and Management of Beef and Dairy Cattle. First Semester. Lecture one hour, laboratory two hours per week. One and two-thirds hours' credit. Fee, \$2.00.

A6. Feeding, Care and Management of Horses, Hogs and Sheep. Second Semester. Prerequisite, Animal Husbandry A5. Lecture, one hour and laboratory, two hours, per week. One and two-thirds hours' credit. Fee, \$2.00.

A7. Animal Breeding, Feeding and Herd Book Study. Fourth Semester. Animal breeding, balancing rations, economical feeding, pedigrees and herd books. Three lectures per week. Three hours credit.

A8. **Poultry Management.** Fourth Semester. Poultry houses, yards, feeding, judging market types, incubation, brooding, anatomy of fowl, diseases, sanitation, caponizing, killing, dressing and marketing. Lectures two hours and one two-hour laboratory period per week. Two and two-thirds hours' credit. Fee, \$2.00.

HORTICULTURE

A2. **Plant Propagation.** Fourth Semester. Plant reproduction, seeds, seed testing, germination, storage, transplanting, grafting, budding and cuttage. Two two-hour practicums per week. Two hours' credit. Fee, \$1.00.

A3. **Fruit Growing.** First Semester. Orchard site, varieties, orchard culture, pruning, spraying and storage. One lecture and one two-hour practicum per week. One and two-thirds hours' credit. Fee, \$1.00.

A14. **Farm Forestry.** Second Semester. Farm woodlots, wind-breaks, forest influences, common timbers and their preservation. One lecture per week. One hour credit.

AGRICULTURAL ENGINEERING

A1. **Blacksmithing.** First or Second Semester. Forging, welding and tempering iron and steel. Management and repair of machinery. Four hours shop work per week. One and one-third hours' credit. Fee, \$2.50.

A2. **Carpentry.** First or Second Semester. Joining, framing, and care of tools. Planning, framing and construction of farm buildings. Four hours shop work per week. One and one-third hours' credit. Fee, \$2.50.

A4. **Field Engineering.** Second Semester. Mensuration of land, surveying, land drainage, irrigation, road construction and farm fences. Drawing, lettering and map making. Recitation one hour, laboratory and lectures two hours, per week, a part of the laboratory period being used for recitation. Two hours' credit. Fee, \$1.50.

A5. **Farm Machinery and Farm Motors.** Third Semester. The development, construction, adjustment, repair and use of agricultural machinery. Principles of draft, the horse as a motor, the windmill, steam, gasoline and electric motors. Laboratory work devoted to the calibration and testing of machines and motors. Recitation two hours, and laboratory two hours, per week. Two and two-thirds hours' credit. Fee, \$2.00.

A6. **Farm Buildings.** Fourth Semester. Planning and construction of farm buildings, cost, convenience, lighting, ventilation and sanitation. Materials, plans and specifications. Recitations, one hour, and laboratory and lectures, two hours, per week. Two hours' credit. Fee, \$1.50.

VETERINARY

A1. Sanitary Science and Obstetrics. Third Semester. General hygiene; water supply, air and ventilation; food and the effects of quality of food; habitation; disposal of excreta; drainage and general rules for disinfecting. Physiological obstetrics, evolution, fecundation, sterility, gestation, hygiene of pregnant animals and parturition. Three hours credit.

ZOOLOGY

A30. General Zoology. First Semester. General animal morphology and physiology, with special reference to mammals on the one hand, and to worms and insects on the other. In the former the physiology of digestion and assimilation is the chief topic, because of its importance in stock feeding. In the latter these points in the structure and life history are treated that have an especial bearing on the worm, insect parasites, and insects injurious to crops dealt with in the next course, Zoology A31. One lecture or recitation and one practicum per week. Two hours credit. Fee, \$3.00.

A31. Entomology. Second Semester. Life history, habits, and methods of combating the more important economic insects and worms. Both those destructive to farm and orchard crops, and also the chief forms parasitic on domestic animals, are studied. One lecture or recitation and one practicum per week. Prerequisite, Zoology A30. Two hours' credit. Fee, \$3.00.

BOTANY

A1. Agricultural Botany. First Semester. Seed germination, elementary principles of plant physiology; the root, shoot, lateral appendages, leaves, flower, fruit and seed, absorption of food materials, conduction of food, storage of food. Special attention is given to the terms used in Descriptive Botany, especially in its relation to Agriculture and Horticulture. One lecture and one practicum per week. Two hours credit. Fee, \$2.00.

A2. Farm Weeds and Seeds. Second Semester. Injurious weeds, methods used to exterminate same; purity and vitality of agricultural seeds; methods used to detect these impurities and to determine vitality. State laws governing destruction of weeds and restriction and sale of agricultural seeds. Two hours' credit.

CHEMISTRY

A57. Elementary Chemistry. First Semester. Principles of chemistry as applied to agriculture. Two hours' credit.

ECONOMIC SCIENCE

A15. Government in State and Nation. City, county, and state governments; constitutional conventions; constitutions and "Supreme Law;" checks and balances; the presidency, senate and house of representatives; general powers of Congress; judicial system, federal and state; division of power; comparison with other federal governments; spoils system and civil service; and government of territories and colonies; text book, supplemented by papers and library work. Recitations, three hours per week.

A22. Rural Economics. Third Semester. Lecture and reading course. History of agriculture in the United States; the crop areas; live stock areas; imports and exports of agricultural products; markets; land tenure; agricultural organizations; coöperation; and rural social problems. Two hours' credit.

LITERATURE

A12. English Classics. A course in literature intended merely to supplement and complete this study for those who have not finished a fully accredited four year high school course. It is taken up mainly as an approach to a more intelligent and discriminating appreciation of literature, and an incentive to a wider and more thoughtful reading. The authors and works studied will be selected with the view of repeating as little as possible what the students have already studied. Prerequisites, English 1 and 2, or their equivalent, and the major part of the work in literature in a fully accredited high school or its equivalent. Four hours' credit.

ENGLISH

A14. Letters and Themes. First Semester. Writing letters of the various forms and types and short papers on familiar subjects. Emphasis placed on correctness and clearness with as much attention as possible to the qualities of force and interest. Short reviews of fundamental principles, when necessary. Three hours' credit.

A15. Letters and Themes. Second Semester. A continuation of Course A14. Three hours credit.

A1. The Sentence. A review of grammar may be given to advanced work. With advanced work correction of common errors, punctuation, analysis of good modern prose, and daily drill in sentence construction, and original composition. Text-book, Buehler's Modern English Grammar. Five hours' credit. Fee, \$.25.

A2. Rhetoric and Composition. Fast review of rhetoric and composition, and also of literature. Prerequisites, English A1 or its equiv-

alent, with the major part of a high school course in rhetoric and composition, and also in literature. For the first ten days there will be a rapid review of grammar, with essays on simple themes. Students who show the need of further review will be required to make up the deficiency. Text-book, Scott & Denny's "Composition—Rhetoric." Five hours a week.

MATHEMATICS

A1. Algebra to Involution. Special stress is laid upon the statement of definitions and the demonstration of principles. It is exceedingly desirable that students taking this course shall have made some preparatory study of the fundamental algebraic operations, though strong students with an earnest purpose can by diligent application, carry the course without such previous preparation.

A2. Algebra, Involution to Ratio and Proportion. Involution of Evolution, Radicals, Pure and Affected Quadratic Equations. Prerequisite, Course A1. At the completion of this course students are expected to have such grasp of algebra through quadratics as will enable them to handle its principles up to this point without error and perform the operations required with reasonable rapidity and accuracy. Recitations, five hours per week.

A3. Algebra Review. This course, which covers all fundamental principles up to and including radicals and quadratics, takes the place of the review in algebra given in most high schools and corresponds to the review in algebra given in an increasing number of the best high schools of the state.

The student is introduced to a quality of work demanding a broad view of principles and methods, and a marked degree of skill in algebraic manipulation.

The course is intended primarily for students who, having taken elementary algebra in the high school, need a thorough review before entering advanced work, but it may be taken by students who show evidence of a thorough knowledge of algebra through simple equations and at least a brief course through radicals. Recitations, five hours per week.

A5. Plane Geometry. Fundamental definitions and axioms, theorems relating to rectilinear figures and the circle, measurement of angles; doctrine of limits; theory of proportion; similar polygons; comparison and measurement of the surfaces of rectilinear figures; measurement of the circle, and geometrical construction of plane figures. The proofs outlined must be fully amplified; definitions must be stated with precision; authority cited must be given in full and the logical steps in demonstration must be so arranged and presented as to constitute a complete and rigid proof. The student must understand each proposition and be able to state the demonstration in concise geometric language. Special emphasis

will be laid upon the demonstration of original exercises. Prerequisite, Course A1. Recitations, five hours per week.

HISTORY

A1. **English History.** Political, constitutional, religious, social and economic development of Great Britain. Special attention to those influences which have affected American history. Text-book, library and written work. Prerequisite, one year of general history. Five hours' credit.

A2. **Advanced American History.** An advanced and comprehensive view of American development. It corresponds to the American history offered in last year in accredited high schools. Text-books, lectures and assignments. Four hours per week.

A16. **The National Period.** A maturer and more comprehensive view of American development from 1789 to the present. Text-book, lectures and assignments. Three hours' credit.

PUBLIC SPEAKING

A2. **The Declamation.** A course planned to help the student get command of himself. Attention given to voice building and bodily expression. Besides this technical work, students are assigned individual selection for practice and each is met for private rehearsal at regular intervals. One hour per week.

ONE YEAR DAIRY COURSE

The One Year Course in Dairying is designed to meet the needs of those who want to acquire a knowledge of practical dairy methods for the purpose of being enabled to operate a creamery, cheese factory or ice cream factory. This course is also of value to dairy farmers who are unable to take a complete college course. Students completing this course will be given certificates when evidence is furnished that they have successfully for one year operated a creamery or other dairy establishment.

Calendar

1911

FIRST SEMESTER

September 1-2, Friday, 8:00 A. M. to Saturday, 5:00 P. M. Registration-Classification Days.

December 20, Wednesday, 5:00 P. M. College Work closes.

1912

SECOND SEMESTER

January 18-20, Thursday, 1:30 P. M. to Saturday, 5:00 P. M. Registration-Classification Days.

June 7, Friday. Summer Vacation Begins.

REQUIREMENTS FOR ADMISSION

Any student desiring to enter this course must be, at least, seventeen years of age, and must present a certificate showing that he has satisfactorily completed the eighth grade of the public school. This certificate must give full and complete high school or academic record of the applicant, and must be signed by the superintendent or principal. All applications for admission should be addressed to the *Registrar, Iowa State College*, who will furnish the proper blanks. These certificates should be filed with the **Registrar** as promptly as possible, and, at least, two weeks before the opening of the semester.

FEES AND EXPENSES

The entire expenses of a student need not exceed \$300.00 per College year.

Tuition. No charge for tuition is made to the students from the state of Iowa. To non-residents, a tuition fee of \$50.00 per year is charged.

Incidental Fee. The regular incidental fee for the semester is \$10.00, but all students who classify during the classification period, Thursday, Friday and Saturday, before College work begins, will be charged only \$8.00 per semester.

Laboratory Fees. Laboratory fees at the actual cost of breakage and usage are charged to the students, the Treasurer's receipt for such fee being required before the students are admitted to laboratories. For the amount of the fee in any course the student should refer to the description of courses, under the department in which the course is taught.

Board and Room. Students can secure furnished rooms and board in clubs or private families adjacent to the College grounds at from \$3.50 to \$5.00 per week.

The College Custodian, office in old office building, should be consulted by all students, concerning rooms and rooming places, that undesirable rooms and houses may be avoided. For sanitary or any other reasons the College authorities reserve the right to forbid students from rooming in any particular house.

Hospital Fee. All students living in College buildings, and such others as desire to do so, pay a Hospital fee of \$2.50 per semester.

Text Books. All text books and stationery may be purchased at the College Book Store at about 20 per cent below the average retail price.

ONE-YEAR COURSE IN DAIRYING

FIRST SEMESTER

Dairying A1,	Dairy Practice	6
Dairying A2,	Buttermaking	1
Dairying A3,	Milk Testing	1
Agricultural Engineering A7	Dairy Engineering	1 $\frac{2}{3}$
Animal Husbandry A19,	Feeding Dairy Stock	2
Chemistry A28,	Dairy Chemistry	1
Dairying A6,	Dairy Bacteriology	1
Soils A3,	Soils and Fertilizing Materials	2
Total semester hours		15 $\frac{2}{3}$

SECOND SEMESTER

Dairying A26,	Judging Dairy Products	1
Dairying A4,	Dairy Practice	6
Dairying A8,	Cheese Making	1
Dairying A5,	Bookkeeping	1
Dairying A20,	Factory Management	2
Animal Husbandry A18,	Breeding and Judging Dairy Stock	2
Dairying A21,	Preparation of Ice Cream and Ices	1 $\frac{2}{3}$
Chemistry A29,	Dairy Chemistry	2
Farm Crops A3,	Grains, Forage and Pasture Crops	2
Total semester hours		18 $\frac{2}{3}$

A1. Dairy Practice. Includes practical work in buttermaking, cheesemaking, ice cream making, pasteurization of milk and cream, preparation of starters, testing of dairy products, and refrigerating engineering. Five to seven hours laboratory work per day. Six hours' credit.

A2. Buttermaking. It includes a study of the composition of milk and dairy products, the principles of gravity and centrifugal separation of cream, cream ripening, preparation of starters, churning and preparation of butter for market. Sixteen lectures per semester.

A3. Milk Testing. A study of the Babcock test, and of the Farington and Manns' test for determining acidity, the use of the lactometer for detecting adulterations, and also the composite sampling and testing of individual cows. One hour credit.

A4. Dairy Practice. Continuation of A1. Six hours' credit.

A5. Bookkeeping. Study of the best form of bookkeeping for the factory business. One hour credit.

A8. Cheese Making. Includes common and fancy cheese as Limburger, Brick, Swiss Roquefort, Sage, Stilton, Pineapple and Gouda. Sixteen lectures per semester.

A20. Creamery Management. A study of the underlying principles in the management of a local creamery. 'Two hours' credit.

A21. Preparation of Ice Cream and Ices. A study of the preparation of ice creams, lacto and ices. One recitation and one two-hour laboratory. One and two-thirds hours' credit.

A26. Judging Dairy Products. Includes the judging of butter, milk and cream, ice cream, sherbert, and the various kinds of cheese, paying special attention to score cards. One hour credit.

AGRICULTURAL ENGINEERING

A7. Dairy Engineering. Management, care and operation of steam and gasoline engines. Recitation, one hour, and laboratory, two hours, per week. One and two-thirds hours' credit. Fee, \$2.00.

ANIMAL HUSBANDRY

A18. Breeding and Judging Dairy Stock. Score card and comparative judging. Principles, methods and practice of breeding, and improvement. Two hours' credit. Lecture, one hour, and laboratory, three hours, per week.

A19. Feeding Dairy Stock. Feeding for economical production, composition and use of various feeding materials, influence of various feeding stuffs on quantity, quality and composition of milk, butter and cheese. Two lectures per week.

CHEMISTRY

A28. Dairy Chemistry. An elementary course arranged to meet the needs of the students in the one year course in dairying. One lecture and one laboratory, one and one-half periods. Two hours' credit. Deposit, \$3.00.

A29. Dairy Chemistry. A continuation of course A28. Recitation, one hour, and laboratory, one and one-half periods. Two hours' credit. Deposit, \$3.00.

AGRONOMY

Farm Crops A3. Forage and Pasture Crops. Fourth Semester. Varieties, soiling crops, pastures, habit of growth, adaptation, palatability, and composition, seeding, handling, harvesting, etc. Two lectures per week. Two hours' credit.

Soils A3. Soils and Fertilizing Materials. First Semester. Improvements of soils, soil organisms, fertility, organic compounds, plant food, fertilizers, manures, and crop rotations. Sandy, arid, alkali, acid, peat and gumbo soils. Lectures, two hours, laboratory lectures and demonstrations, two hours, per week. Two hours' credit. Fee, \$1.50.

Winter Short Courses

CHARLES FRANKLIN CURTISS, DEAN OF AGRICULTURE

Agronomy, Animal Husbandry, Poultry, Dairying, Horticulture, Soils, Agricultural Engineering and Domestic Science

The special short course in agriculture, which originated in this institution in January, 1900, met with popular favor. The work has proven to be of great practical value and the attendance has extended far beyond the borders of the state and has reached nearly a thousand annually. A large amount of instruction is crowded into a brief period. Class and laboratory work extend from 8:00 A. M. to 5:00 P. M. daily except Sunday, and the evenings are devoted to convention programs consisting of lectures and general discussion of topics of interest to those in attendance. This is an intensified system and a modern method of imparting instruction and inspiration to busy, practical men and women whose lives are devoted to agricultural pursuits. Many of the most prominent and successful men of the state and nation are annually attracted to these sessions. It is believed that the work furnished during the coming winter will be more practical and more popular than at any previous session.

Calendar

1912

January 1, Monday, 8:00 A. M. Registration.

Monday, 10:00 A. M. Classes Begin.

January 12, Friday, 5:00 P. M. Session Closes.

Fees and Expenses

The fees required in the different courses are payable at the treasurer's office, or such place as he may designate, where it will be most convenient to those in attendance. The enrollment fee of \$3.00 for residents and \$5.00 for non-residents of the state, covers all charges of this nature except in the Dairy Department, where higher rates are charged on account of the greater expense involved in giving the work. Board and room may be had near the college for \$4.50 to \$5.00 per week. A Bureau of Information will be maintained in the new Agricultural Hall to assign boarding places.

ANIMAL HUSBANDRY

In response to a widespread demand for special short course instruction in the judging and feeding of animals, a two weeks' course has been established during the winter vacation. This course will be devoted exclusively to score card practice, and judging of horses, cattle, sheep, and hogs, and lectures on feeding the same.

In this work special attention will be given to the selection of animals best suited for feeding purposes. Good specimens of the highest type of fat steers and ideal representatives of all the various breeds will be used for class work. At the conclusion of the cattle work a slaughter test and block demonstration of the various market types of steers will be conducted under the supervision of John Gosling, Kansas City, Missouri.

POULTRY HUSBANDRY

In the ten days available for instructional purposes, lectures, demonstrations and practical exercises will be given in the most important points of poultry management. Some of the topics that will be discussed in the lectures are The Importance of the Poultry Industry, Selection of Poultry Farms, Building Poultry Houses, Feeding for Egg and Meat Production, Selection of Breeding Stock, Incubation, Brooding, Raising Chicks, Caponizing, Killing, Dressing and Marketing of Poultry, Diseases and Parasites. Frequent use will be made of charts and lantern slides in this work.

The practical exercises and laboratory work will consist of exercises in studying poultry houses, incubators, brooders, anatomy of the fowl and egg, study of feeds, killing and dressing of fowls, selection of breeding stock, preparing fowls for exhibition.

AGRONOMY

Farm Crops. The Agronomy Department will offer an excellent course in Farm Crops and Crop Production this year. This work will be so arranged as to meet the demands of the men who have already attended one or more Short Courses here, as well as those who will attend this year for the first time. The first year men will devote much of their time to judging work, while the more advanced students will give more time to the consideration of some of the latest experimental work, as this may be related to farm practice.

Corn. The characteristics and adaptation of the various varieties of corn will be studied fully. Aside from the corn judging work, practice will be given in corn grading, in order that we may meet to better advantage market demands. Considerable attention will also be given to various methods of testing corn.

Small Grains. Wheat, oats and barley will be studied carefully, taking up, aside from the judging and grading, a study of variety characteristics and adaptation, methods of seeding, etc.

Forage Crops and Grasses. Our grass lands are not giving as great returns as they should. Aside from the consideration of preparation of seed beds, seeding and curing, a study will be made in the laboratory of the characteristics of the more important grasses and legumes.

Cereal Breeding. Considerable attention will be given to improvement of corn and small grains by systematic breeding.

Farm Management. Some investigations have been in progress in this state which will be found of great interest and value. A practical, thorough study of a system of farm accounts is a special feature.

SOILS

A series of lectures and demonstrations dealing with soil management and the fertility problem with special reference to Iowa soils. Valuable facts and data will be presented regarding commercial fertilizers, green manures, barnyard manures, the use of leguminous crops, and indirect fertilizers, such as lime. In addition to the fertility problem, special emphasis will be placed upon methods of plowing, cultivating, preparing the seed bed, etc.

HORTICULTURE AND FORESTRY

The subjects will be presented by lectures in some of which use will be made of charts and lantern slides. Also demonstrations will be given in pruning, grafting, making cuttings and the preparation and application of spray materials. A collection of fruits and vegetables will be kept on exhibition during the second week of the short course. Various types of modern spraying apparatus will be shown in the Laboratory of the Department of Agricultural Engineering. The College Campus affords a rare opportunity for studying the deciduous and coniferous trees for shade and ornamental planting and the effective grouping of shrubs for the lawn and park. The plantations also give an excellent opportunity for the study of farm wood lots and trees suitable for such planting.

DAIRYING

Course 1

Dairy Demonstrations, Buttermaking, Factory Management, Bacteriology, Testing Milk and its Products, Scoring, Dairy Products, Refrigeration, Dairy Engineering, Ice Cream Making, Feeding and Breeding Dairy Stock. This course is especially designed for buttermakers, and ice cream makers with some experience.

A fee of \$10 will be charged each student. This will cover the necessary expenses of this course, excepting board. Students should provide themselves with white suits, which can be procured for \$1 per suit in local stores.

Course 2

Dairy Practice, Buttermaking, Cheesemaking, Scoring Dairy Products, Bacteriology, Care of Milk and Cream, Ventilation of Dairy Barns, Judg-



One of the Cooking Laboratories. Home Economics Department

ing Dairy Stock and Swine, Feeding and Breeding Dairy Stock, Poultry, Obstetrics and Tuberculosis, Our Record Testing Associations.

Silo and Its Construction, two lectures.

Steam and Gasoline Engines, two lectures.

This course is offered by the Animal Husbandry and Dairy Departments and is intended for dairy farmers, their wives, sons and daughters. It will include a thorough study in milk production, care of milk on the farm, buttermaking and cheesemaking on the farm, etc.

The afternoon of each day will be given over to practical demonstrations and the forenoons to lectures.

A fee of \$4 will be charged to cover the necessary expenses.

AGRICULTURAL ENGINEERING

A series of lectures on various phases of agricultural engineering. These lectures and demonstrations have in past years been well received and many will be glad to learn that additional work of this nature will be added this year. These lectures will not conflict with the work scheduled by other departments and are designed to be of general interest and will be illustrated by lantern views and accompanied with demonstrations, where possible.

The following list of subjects will be discussed: Farm Machinery and its Management, Modern Silo Construction, The Road Problem, The Use of Cement and Concrete on the Farm, Laying out the Drainage System, The Gasoline Engine and its Successful Operation, Farm Building Construction, Corn Growing Machinery.

HOME ECONOMICS

The course is designed for all women who are interested in the practical and scientific working out of household problems and who are unable to avail themselves of a regular course in Home Economics.

Hundreds of agricultural men and their sons yearly take advantage of the Short Courses which deal with the problems of the farm, such as feeding of cattle, judging of corn, study of soils, etc. It is to meet the demand of Iowa women in their interest shown in the correct feeding of the family, the judging and selecting of materials used in the home, and the study of sanitary conditions which lead to the health, comfort and happiness of the family, that this course has been established and carried on for the past four years.

The course consists of the following subjects: Practical Lessons in the Values and Cookery of Foods; Foods for School Children, Growing Boys and Girls, Adults in Active Life, the Aged and Invalids; Methods of Preparing and Serving These Foods.

Practical course in Domestic Art is offered which deals with the principles of home garment making; lectures upon the choice of materials suitable for garments of various kinds, upon the subjects of home decora-

tion and furnishing, home sanitation and the care of sick will be given throughout the course.

VETERINARY LECTURES

The series of lectures will include tuberculosis and other diseases of cattle and swine. The prevention, control, and eradication of the infections and contagious diseases will receive special emphasis, including the application of sanitary principles involved in each case. On account of the increasing importance of the eradication of bovine tuberculosis these lectures should be of special interest to all. The new serum treatment for the prevention of hog cholera will also be discussed.

The series will also include the lectures on Lameness and Horse-shoeing, including diseases of the foot. These subjects will be considered from a scientific standpoint, but described in a way so as to be understood by everybody.

The Conformation and Soundness of the horse will be taken up and illustrated on the live animal. Those points which should be borne in mind in the breeding of farm animals will receive special emphasis.

While it is impossible to give a course in Veterinary Medicine, the subjects of especial interest and immediate importance to the agriculturist will be considered as well as their practical application to farm conditions.

BOTANY

The laboratories of the Botany Department in Central Building will be open from 8 to 9 and 4 to 5 each day, for work in seed testing, identification and examination of weeds and weed seeds, or other special work that may be arranged with Dr. Pammel, head of the department. Special attention will be given to the identification of weeds common to Iowa farms, and to the provisions of the Iowa weed laws.

A special course of instruction will be arranged to meet the needs of seedsmen with reference to the requirements of the seed inspection law.

SPECIAL WORK FOR BOYS AND GIRLS

There will be special classes for Juniors (boys and girls between 10 and 18 years).

These classes will be in charge of persons particularly skilful in teaching boys and girls and the work will be especially adapted to them.

The Second Annual State Junior Contest will be held at the college during the time of the Short Course at which prizes are offered for the best corn, oats, potatoes, cooking, sewing, essays, etc.

At this contest the Boys' Corn Judging teams will compete again for the beautiful \$250 Kimball's Dairy Farmer trophy won last year by the team from Page county.



One of the Sewing Laboratories. Home Economics Department

There will also be offered this year for the first time a suitable trophy to the girls for the best judging team in domestic science. Localities are urged to send teams of boys and girls (three persons in each) to compete for these trophies.

The work in the special Junior classes will aid in preparing the boys and girls for these contests.

ARMOUR SCHOLARSHIPS

The Iowa State College has since the Armour Scholarships were established, won from \$1,500 to \$2,000 annually, which is awarded at the close of each short course in the form of scholarships of \$250 each, restricted to worthy young men who are dependent on their own resources and who have not had collegiate work. These scholarships have made it possible for many young men of limited means to obtain a college education. This generous action on the part of Mr. Armour is significant not only on account of its far-reaching results, but in the recognition of the value of college training for agricultural pursuits by the great leaders of business enterprise in America. The conditions governing these scholarships are herein stated.

The contest will begin at the lower pavilion at 8 o'clock, Saturday morning, January 6.

The following classes will be judged:

Corn.—One class of Reid's Yellow Dent; one of Leaming; one of Boone County White.

Stock.—Two classes of cattle; two hours; two sheep, and two of swine.

These scholarships will be awarded to students under twenty-one years of age of limited means, who are upon their resources and who would otherwise be unable to secure a college education, and who have not had previous college work.

The winners of these scholarships will be expected to meet the entrance requirements for one of the regular collegiate courses in Agriculture in the Iowa State College. The young man to whom a scholarship is awarded may have until September 1, 1912, in which to qualify and enter as a regular student. A scholarship not duly accepted and qualified for, may at the end of the period above named be awarded to the candidate having the next highest standing.

The scholarships will be paid in monthly installments, on the order of the Dean of Agriculture, after the student is regularly enrolled and may be withheld in case of unsatisfactory work or misconduct on the part of the student.

Students wishing to enter this contest will be expected to file their names with Dean Curtiss Friday afternoon between two and five p. m.

5

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DIVISION OF AGRICULTURE
AUGUST, 1912
AMES, IOWA

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Calendar

1912.

FIRST SEMESTER

August 30-31, Friday, 8:00 A. M., Registration-Classification Days.
to Saturday, 5:00
P. M.

December 20, Friday, 5:00 P. M. College Work closes.

1912-1913.

December 30 to January 11, Mon- Special Short Courses in Agricul-
day to Saturday ture and Home Economics.

1913.

SECOND SEMESTER

January 17-18, Friday, 8:00 A. M., Registration-Classification Days.
to Saturday, 5:00
P. M.

June 5, Thursday, 10:30 A. M. Commencement Address and Pre-
sentation of Diplomas.

1913.

FIRST SEMESTER

September 9-10, Tuesday and Wed- Entrance Examinations.
nesday, 8:00 A. M.

September 12-13, Friday, 8:00 A. Registration-Classification Days.
M., to Saturday,
5:00 P. M.

December 23, Tuesday, 5:00 P. M. Christmas vacation begins.

December 29, Monday, 8:00 A. M., Special Short Courses in Agricul-
to January 9, Fri- ture and Home Economics.
day, 5:00 P. M.

January 13, Tuesday, 7:40 A. M. Christmas vacation closes.

February 6, Friday, 5:00 P. M. Semester closes.

1914.

SECOND SEMESTER

February 6-7, Friday, 8:00 A. M., Registration-Classification Days.
to Saturday, 5:00
P. M.

February 9, Monday, 7:40 A. M. College work begins.

June 11, Thursday, 10:30 A. M. Commencement.

State Board of Education of Iowa

MEMBERS

HON. J. H. TREWIN, PRESIDENT.....	Cedar Rapids
HON. A. B. FUNK.....	Spirit Lake
HON. GEO. T. BAKER.....	Davenport
HON. ROGER LEAVITT.....	Cedar Falls
HON. D. D. MURPHY.....	Elkader
HON. CHAS. R. BRENTON.....	Dallas Center
HON. P. K. HOLBROOK.....	Onawa
HON. EDW. P. SCHOENTGEN.....	Council Bluffs

One vacancy caused by resignation of Hon. T. D. Foster of Ottumwa.

FINANCE COMMITTEE

HON. W. R. BOYD, President.....	Cedar Rapids
HON. THOMAS LAMBERT.....	Sabula
HON. D. A. EMERY, Secretary.....	Ottumwa

Officers of Instruction

*THE FACULTY

DEANS

- EDGAR WILLIAMS STANTON. †1877, 1874..Acting President, Dean of Junior College, Dean of Division of Science, Professor of Mathematics
B. Sc., Iowa State College, 1872; M. Sc., 1887; LL. D., Coe, 1904.
- CHARLES FRANKLIN CURTISS. 1897, 1891..Dean of the Division of Agriculture, Director of Experiment Station
B. S. A., Iowa State College, 1887; M. S. A., Iowa State College, 1892; D. Sc. in Agriculture, Michigan Agricultural College, 1907.
- ANSON MARSTON. 1892..Dean of Division of Engineering, Professor of Civil Engineering
B. C. E., Cornell University, 1889.
- CHARLES HENRY STANGE. 1909-1907..Dean of the Division of Veterinary Medicine, Professor of Theory and Practice and Sanitary Science
D. V. M., Iowa State College, 1907.

PROFESSORS

- HONORABLE JAMES WILSON. 1902, 1891..Lecturer in Agriculture
M. S. A., Iowa State College, 1907.
- GENERAL JAMES RUSH LINCOLN. 1884, 1883..Professor of Military Science
- ALFRED ALLEN BENNETT. 1885.....Professor of Chemistry
B. Sc., Michigan, 1877; M. Sc., Iowa State College, 1888.
- HERMAN KNAPP. 1887, 1883.....Registrar
B. S. A., Iowa State College, 1883.
- LOUIS HERMANN PAMMEL. 1889.....Professor of Botany
B. Agr., Wisconsin, 1885; M. S., 1889; Ph. D., Washington, St. Louis, 1898.
- LOUIS BEVIER SPINNEY. 1897, 1891.....Professor of Physics and Illuminating Engineering
B. M. E., Iowa State College, 1892; B. S. (E. E.), 1893.
- SAMUEL WALKER BEYER. 1898, 1891..Vice Dean of Division of Engineering, Professor of Geology and Mining Engineering
B. S. Iowa State College, 1889; Ph. D., Johns Hopkins, 1895.

* The Deans, Professors and Associate Professors constitute the College Faculty.

† First date after the name indicates date of appointment to present position, the second date, when the first fails to do so, indicates the date of first appointment in the College.

- ALVIN BUELL NOBLE. 1898....Professor of Rhetoric and Literature
B. Ph., University of Iowa, 1887.
- HENRY ELIJAH SUMMERS. 1898.....Professor of Zoology
B. S., Cornell University, 1886.
- ORANGE HOWARD CESSNA. 1900.....Professor of History and
Psychology
B. S., Iowa State College, 1872; B. D., Garrett Biblical Institute,
1885; D. D., 1900; A. M., Cornell College, 1901.
- WILLARD JOHN KENNEDY. 1901..Professor of Animal Husbandry,
Vice Director of Experiment
B. S. A., Iowa State College, 1899. Station
- WILLIAM HENRY STEVENSON. 1903, 1902.....Professor of
Agronomy
A. B., Illinois College, 1893; B. S. A., Iowa State College, 1905.
- SPENCER AMBROSE BEACH. 1905....Vice Dean of the Division of
Agriculture, Professor of Horticulture
B. S. A., Iowa State College, 1887; M. S., Iowa State College, 1892.
- PERRY GREELEY HOLDEN. 1906, 1902.....Superintendent of Agri-
cultural Extension Work.
B. S., Michigan Agricultural College, 1889; M. S. 1894; B. Pd.
Michigan Normal School, 1894.
- BENJAMIN HORACE HIBBARD. 1906, 1902..Professor of Economic
and Political Science
B. S. A., Iowa State College, 1898; Ph. D., Wisconsin, 1902.
- WARREN H. MEEKER. 1907, 1891.....Professor of Mechanical
Engineering
M. E., Cornell University, 1891.
- FRED ALAN FISH. 1907, 1905....Professor of Electrical Engineering
M. E. in E. E., Ohio State University, 1898.
- JAY BROWNLEE DAVIDSON. 1907, 1905..Professor of Agricultural
B. S., M. E., Nebraska, 1904. Engineering
- ASHLEY VAN STORM. 1907.....Professor of Agricultural
Education
Ph. B., Illinois Wesleyan, 1898.
- ARTHUR MACMURRAY. 1908.....Professor of Public Speaking
A. B., Kansas, 1896; M. O., Ott School of Expression, Chicago, 1904.
- ROBERT EARLE BUCHANAN. 1909, 1904..Professor of Bacteriology
B. S., Iowa State College, 1904; M. S., Iowa State College, 1906;
Ph. D., Chicago, 1908.

- MARTIN MORTENSEN. 1909.....Professor of Dairying
B. S. A., Iowa State College, 1909.
- FLETCHER BRIGGS. 1909.....Professor of Modern Languages
Ph. B., Iowa, 1901; M. A., 1902.
- HAROLD DE MOTT HUGHES. 1910.....Professor of Farm Crops
B. S., University of Illinois, 1907; M. S. A., University of
Missouri, 1908.
- CATHERINE J. MACKAY. 1911, 1910..Professor of Home Economics
Drexel Institute. Diploma in Domestic Science, Boston Cooking
School, Teachers' College, Columbia University.
- WILLIAM WALLACE DIMOCK. 1911, 1909..Professor of Veterinary
Pathology and Bacteriology
B. Agr., Connecticut Agricultural College, 1901; D. V. M., Cornell
University; D. V. M., University of Habana, 1907.
- FREDERICK WILLIAM BECKMAN. 1911..Professor of Agricultural
Journalism
Ph. L., University of Iowa, 1897.

ASSOCIATE PROFESSORS

- MARIA M. ROBERTS. 1904, 1891.....Vice Dean of Junior College,
Associate Professor of Mathematics
B. L., Iowa State College, 1890.
- ARTHUR THOMAS ERWIN. 1904, 1900.....Associate Professor of
Horticulture
B. S., Arkansas, 1899; M. S. A., Iowa State College, 1902.
- LOLA ANNE PLACEWAY. 1905, 1896..Associate Professor of Chemistry
B. S., Iowa State College, 1895.
- VINA ELETHE CLARK. 1897.....Librarian
- JOHN PIPER WATSON. 1904.....Physical Director
- IRA A. WILLIAMS. 1907, 1898....Associate Professor of Geology and
Mining Engineering
B. S., Iowa State College, 1898; M. S., Iowa State College, 1903;
A. M., Columbia, 1904.
- JOHN EDWARD KIRKHAM. 1907..Associate Professor of Structural
Engineering
B. S., in C. E., Missouri, 1895.
- WINFRED FORREST COOVER. 1907, 1904....Associate Professor of
Chemistry
A. B., Otterbein University; A. M., Ohio State University.
- LAURENCE C. HODSON. 1907, 1896....Associate Professor of Mining
Engineering
B. C. E., 1898; E. M., Michigan College of Mines, 1901.
- MARK PERKINS CLEGHORN. 1908, 1902....Associate Professor of
Mechanical Engineering
B. S. in E. E., 1902, Iowa State College, M. E., 1907.

- ADOLPH SHANE. 1908, 1904.....Associate Professor of Electrical
Engineering
B. S. in E. E., Nebraska, 1901; E. E., Iowa State College, 1908.
- CHARLES CURTIS MAJOR. 1908..Associate Professor of Mechanical
Engineering
M. E., Blomberg Normal School, Pa., 1891; M. E., Cornell University, 1898.
- EDWARD NORRIS WENTWORTH. 1909, 1907..Associate Professor
of Animal Husbandry
B. S. A., Iowa State College, 1907; M. S. A., Iowa State College, 1909.
- WILLIAM HARPER PEW. 1909.....Associate Professor of Animal
Husbandry
B. S. A.; Iowa State College, 1907.
- CLARE NEWTON ARNETT. 1910.....Associate Professor of
Animal Husbandry
B. S., Purdue University, 1907.
- LOUIS BERNARD SCHMIDT. 1911, 1906....Associate Professor of
History
Ph. B., Cornell College, 1901; A. M., 1906.
- ROY A. NORMAN. 1911, 1907.....Associate Professor of Mechanical
Engineering
B. M. E., Iowa State College, 1903; M. E., Iowa State College, 1909.
- HOWARD CARLTON FORD. 1911, 1907..Associate Professor of Sur-
veying and Irrigation
B. S. (C. E.), Colorado, 1904; M. S., 1905; C. E., 1907.
- ARTHUR HENRY HOFFMAN. 1911, 1905....Associate Professor of
Physics
A. B., Iowa Wesleyan, 1897; A. M., 1905; B. S. in E. E., Iowa State College, 1905.
- WILLIAM BALLENTYNE ANDERSON. 1911, 1905..Associate Profes-
sor of Physics
B. S. Wisconsin, 1901; M. S., 1903; Ph. D., 1906.
- JOHN EDWIN BRINDLEY. 1911, 1907.....Associate Professor of
Economic Science
B. L., Wisconsin, 1902; A. M., 1906; Ph. D., Iowa State University, 1911.
- HAROLD EDWARD BEMIS. 1911, 1908..Associate Professor of Sur-
gery and Obstetrics
D. V. M., Iowa State College, 1908.
- HOWARD SYLVESTER MURPHEY. 1911, 1909....Associate Profes-
sor of Veterinary Anatomy and Histology
D. V. M., Ohio, 1908.

- HENRY HERBERT KILDEE. 1911, 1910....Associate Professor of
Animal Husbandry, in Charge of Dairy Farm
B. S. A., Iowa State College, 1908.
- GILMOUR BEYERS MACDONALD. 1911, 1910...Associate Professor
of Forestry
B. S. F., University of Nebraska, 1907.
- GRACE ELFLEDA RUSSELL. 1911, 1910.....Associate Professor of
Domestic Art
B. S., Teachers' College, Columbia University, 1908.
- EVERETT EDGAR KING. 1911.. Acting Associate Professor of Rail-
way Engineering
B. S., Rose Polytechnic Institute, 1901, M. S., 1909; A. B. Indiana
University, 1910; M. C. E. Cornell University, 1911.

ASSISTANT PROFESSORS.

- ALEXANDER STEWART THOMPSON. 1907..Director of Music, Piano,
Pipe Organ and Voice
Royal College, London; Guild Hall School of Music, London.
- CLARA DUTTON-THOMPSON. 1907..Vice-Director Voice, Prepara-
tory Piano and Organ
Cazenovia Seminary; Guild Hall School of Music.
- JOSEPH EDWARD GUTHRIE. 1904, 1902....Assistant Professor of
Zoology
B. S., Minnesota, 1900; M. S., 1901.
- ERNEST ALANSON PATTENGILL. 1906, 1900..Assistant Professor
of Mathematics
B. S., Iowa State College, 1897; B. S., Cornell University, 1899.
- JULIA TRUEMAN COLPITTS. 1906, 1900.....Assistant Professor of
Mathematics
A. B., Mount Allison University, Canada, 1899; A. M., Cornell
University, 1900.
- ELIZABETH MOORE. 1908, 1904.....Assistant Professor of English
Ph. B., Iowa College, 1900; Ph. M., Chicago, 1902.
- WINIFRED RICHARDS TILDEN. 1908, 1904.....Physical Directress
B. A., Mount Holyoke, 1904.
- DORA GILBERT TOMPKINS. 1908, 1905.....Assistant Professor of
English
A. B., Monmouth College, 1893; A. M., Knox College, 1898.
- JULIA RAMSEY VAULX. 1908, 1906..Assistant Professor of English
A. B., Arkansas, 1894; A. M., Cornell University, 1897.
- ROY HIRAM PORTER. 1908, 1906..Assistant Professor of Mechanical
Engineering
B. M. E., Maine, 1906.

- MORRISS IRWIN EVINGER. 1908, 1906.....Assistant Professor of
Civil Engineering
B. C. E., Iowa State College, 1906.
- C. E. BARTHOLOMEW. 1909, 1904..Assistant Professor of Entomology
B. S., Iowa State College, 1904; M. S., 1907.
- WILLIAM RANDOLPH RAYMOND. 1909, 1907..Assistant Professor
of English
A. B., Grinnell, 1894.
- ROY WINCHESTER CRUM. 1909, 1907..Assistant Professor of Civil
Engineering
B. C. E., Iowa State College, 1907.
- *HARRY WOY GRAY. 1909..Assistant Professor of Civil Engineering
B. C. E., Iowa State College, 1906.
- JESSE GREENLEAF HUMMEL. 1910, 1903....Assistant Professor of
Mechanical Engineering
B. M. E. Iowa State College, 1902.
- JOHN THAXTER BATES. 1910, 1907.....Assistant Professor of
Mechanical Engineering
B. M. E., University of Maine, 1907.
- PERCY EDGAR BROWN. 1910.....Assistant Professor of Soil
Bacteriology
B. S. Rutgers, 1906; A. M., Rutgers, 1909.
- WALTER HENRY COOPER. 1910....Assistant Professor of Dairying
B. S. A., University of Wisconsin, 1907; M. S., University of Wisconsin, 1909.
- WARD MURRAY JONES. 1911, 1902....Assistant Professor of Mathe-
matics
B. C. E., Iowa State College, 1897.
- CHARLES OSMOND ALEXANDER. 1911, 1908...Assistant Professor
of Agricultural Engineering
B. M. E., Iowa State College, 1908.
- WILLIAM A. LIPPINCOTT. 1911, 1908..Assistant Professor of Animal
Husbandry
A. B., Illinois, 1903; B. S., in A. H., Iowa State College, 1911
- ROY EUGENE SMITH. 1911, 1909.....Assistant Professor of Soils.
B. S. A., Iowa State College, 1909; M. S., 1911.
- CHESTER CHARLES FOWLER. 1911, 1909.....Assistant Professor of
Chemistry
B. S., in Chem. Eng., University of Illinois, 1909.

* Leave of absence from July 1, 1911.

- JAMES CLOYD BOWMAN. 1911, 1910.....Assistant Professor of English
B. S., Ohio Northern, 1905; B. Litt., 1908; A. M., Harvard, 1910.
- GRACE MEDORA VIALI. 1911, 1910....Assistant Professor of Home Economics
Ph. B., Ed. B., University of Chicago, 1906.
- HENRY DALE BERGMAN. 1911, 1910..Assistant Professor of Physiology and Therapeutics
D. V. M., Iowa State College, 1910.
- NELSON COURTLANDT BROWN. 1911.....Assistant Professor of Forestry
B. A., Yale, 1906; M. F. Yale, 1908.
- OTTO THEODORE HOKAASEN. 1911.....Assistant Professor of History
A. B., Luther College, 1909. A. M., Northwestern University, 1910.
- GEORGE ANDREW GABRIEL. 1911.....Acting Assistant Professor of Mining Engineering
B. S., Worcester Polytechnic Institute, 1899.
- JOHN OWEN RANKIN. 1911.....Assistant Professor of Economics
A. B., Tarkio College, 1904; B. S. A., Iowa State College, 1908.
- MARTIN FRANCIS PAUL COSTELLOE. 1911....Assistant Professor of Agricultural Engineering
B. S. in C. E., University of Nebraska, 1906.
- JOHN NATHAN MARTIN. 1911.....Assistant Professor of Botany
A. B., Indiana University, 1907.
- HAROLD CRISWELL BARTHOLOMEW. 1911..Assistant Professor of Electrical Engineering
M. E. in E. E., Ohio State University, 1906.
- BERNARD WERNICK HAMMER. 1911.....Assistant Professor of Dairy Bacteriology
B. S. A., University of Wisconsin, 1908.

INSTRUCTORS

- EZRA CORNELIUS POTTER.....Instructor in Pattern Shop, 1898
- ANNIE WILSON FLEMING, B. S....Instructor in Mathematics, 1900
- GRACE ISABEL NORTON, B. A.....Instructor in German, 1901
- EDWARD MERRITT SPANGLER.....Instructor in Pattern Shop,
1905, 1904
- LOLA STEPHENS, B. S.....Instructor in Chemistry, 1906, 1905
- LAURA MAY TAGGART, B. S.....Instructor in Chemistry, 1907, 1906

INGEBORG G. LOMMEN, M. L.....	Instructor in German, 1907
WILLIAM KUNERTH, A. B.....	Instructor in Physics, 1907
HELEN FLORENCE SMITH, A. B....	Instructor in Mathematics, 1907
FREDERICKA VON TRICE SHATTUCK, B. A..	Instructor in Public Speaking, 1907
JOSEPH B. VARELA.....	Instructor in Mechanical Drawing, 1907
JAMES WILLIAM CAMERON...	Instructor in Forge Work, 1908, 1907
JOHN A. SAWIN.....	Instructor in Foundry, 1908, 1907
AGNES GINA MOSHER, M. S.....	Instructor in Mathematics, 1908
MRS. MARY PETERS FAIRFIELD, B. A...	Instructor in French, 1908
MRS. MARGARET ALISON ARVILLE, A. B....	Instructor in Spanish and French, 1908
DANIEL WILLIS SYLVESTER..	Instructor in Agricultural Engineer- ing, 1909, 1908
CHARLES MURRAY, B. Pe.....	Instructor in Bacteriology, 1909, 1908
CHARLES ALTON BAUGHMAN..	Instructor in Civil Engineering, 1909
HERBERT JOHN PLAGGE, B. S..	Instructor in Physics and Illuminat- ing Engineering, 1909
WILLIAM ALFRED BEVAN, B. S.....	Instructor in Physics, 1909
INGEBORG SVENDSEN TUNE.....	Instructor in Music, 1909
JOHN HUG, B. M. E.....	Instructor in Machine Shop, 1909
NELLIE NAYLOR, B. A.....	Instructor in Chemistry, 1909
ARTHUR LAWRENCE BAKKE, B. S.....	Instructor in Botany, 1909
ADA HAYDEN, B. S., M. S.....	Instructor in Botany, 1910
BRUCE MAGILL HARRISON, B. S., M. S..	Instructor in Zoology, 1910
EDWARD ALBERT EBERHARDT, A. M...	Instructor in German, 1910
HARRIET EDITH SESSIONS, B. S.....	Reference Librarian, 1910
EDWARD HENRY DUSHAM, B. A.....	Instructor in Zoology, 1910
BURLEIGH BUREN REED, B. S.....	Instructor in Chemistry, 1910
FRANK WISDOM ALLEN, JR., B. S. A.....	Instructor in Horti- culture, 1910
FRANK ANSON ROBBINS, B. S., A. B.....	Instructor in Electrical Engineering, 1910
WILLIAM ROY HECKLER, B. S. A....	Instructor in Farm Crops, 1911
ALOIS F. NICKELS.....	Instructor in Mechanical Engineering, 1911
JOHN FERDINAND FERM....	Instructor in Mechanical Drawing, 1911
STANLEY BLACK FRACKER, A. B....	Instructor in Zoology, 1911
WINFRED SARAH GETTEMY....	Instructor in Domestic Art, 1911
WILLIAM ALLEN LINTNER, B. S. A..	Instructor in Farm Crops, 1911
RAY GLENN JONES, B. S. in Dairying..	Instructor in Dairying, 1911
EDWARD SAWTELLE WELLES.....	Instructor in Bacteriology, 1911
GEORGE SUTHERLAND, S. B.....	Instructor in Chemistry, 1911
WILLIAM OTTERBEIN ELLIS, A. B....	Instructor in Zoology, 1911
HELEN HENRIETTA SCHELL, A. B....	Instructor in Chemistry, 1911
JOHN HALL BUCHANAN, B. S.....	Instructor in Chemistry, 1911
HELEN HUNTING, B. A.....	Instructor in Chemistry, 1911

ROLLAND SCHANEL WALLIS, B. S. in E. E., B. S. in C. E....In-
structor in Civil Engineering, 1911
ZELMA ZENTMIRE, B. S.....Instructor in Chemistry, 1911
CARRIE ADELA RANKIN, A. B..Instructor in Public Speaking, 1911
MILTON FERDINAND BEECHER, B. S. in Cer.....Instructor in
Ceramics, 1911
CLAUD COYKENDALL, B. S. in C. E....Instructor in Civil Engineer-
ing, 1911
CHARLES L. BEARDSHEAR, B. S. in Dairy..Instructor in Dairying,
1911
R. R. CLEM.....Instructor in Agricultural Engineering, 1911
RUTH MICHAELS.....Instructor in Home Economics, 1911
LEE W. FORMAN, B. S. A.....Instructor in Soils, 1911
FRANK N. MARCELLUS.....Instructor in Poultry, 1911

RESIDENT LECTURER

GEORGE JUDISCH.....Lecturer in Pharmacy, 1901

NON-RESIDENT LECTURER

OLE JOHN HENDERSON, B. S., B. L. L..Lecturer in Rural Law, 1909

ASSISTANTS

HARRIETTE KELLOGG, A. M.....Curator of the Herbarium, 1903
GEORGE MITCHELL.....Farm Superintendent, 1906
CHARLES L. MUNDHENK.....Brass Instruments, 1906
CAROLINE E. LAIRD...Assistant Librarian, Engineering Library, 1907
*VERA MORLAN DIXON, B. S..Assistant Librarian, General Library,
1908
ROBINA MARGUERITE RAE.....Assistant Librarian, Agricultural
Library, 1909
MELLIE MORRIS SMITH.....Cataloguer, Library, 1909
JOHN REARDON.....Gardener, 1909
BRUCE A. COLE...Mechanician, Civil and Electrical Engineering, 1909
MARIA CLARK BRACE, Ph. B..Assistant Librarian, General Library,
1911
KATHREEN HOLDRIDGE, A. B..Assistant Cataloguer, Library, 1911
NELSON LOUIS NELSON, D. V. M.....House Surgeon, Veterinary
Department, 1911

STUDENT ASSISTANTS

IVA L. BRANDT.....Student Assistant in Home Economics, 1911
ROY TRUAX.....Student Assistant in Bacteriology, 1909
H. S. DOTY.....Student Assistant in Botany, 1911
ELIZABETH McKIM.....Student Assistant in Mathematics, 1911
ANNA WOLFE.....Student Assistant in Mathematics, 1911
ROBERT LYLE SPENCER..Student Assistant in Mechanical Engineer-
ing, 1911
CLEM J. O'NEILL.....Student Assistant in Dairying, 1911

* Leave of absence one year.

Agricultural Experiment Station Staff

EDGAR WILLIAMS STANTON, M. S., LL. D..... Acting President
CHARLES FRANKLIN CURTISS, M. S. A., D. S..... Director
WILLARD JOHN KENNEDY, B. S. A.... Vice Director and Animal
Husbandry
LOUIS HERMANN PAMMEL, B. Ag., M. S., Ph. D..... Botanist
HENRY ELIJAH SUMMERS, B. S..... Entomologist
WILLIAM HENRY STEVENSON, A. B., B. S. A..... Soils
SPENCER AMBROSE BEACH, B. S. A., M. S..... Horticulturist
JAY BROWNLEE DAVIDSON, B. S., M. S. A.. Agricultural Engineering
CHARLES HENRY STANGE, D. V. M..... Veterinary
ROBERT EARLE BUCHANAN, M. S..... Bacteriologist
VINA ELETHE CLARK..... Station Librarian
MARTIN MORTENSEN, B. S. A..... Dairying
WILLIAM WALLACE DIMOCK, D. V. M..... Veterinary
ARTHUR WAYLAND DOX, B. S., A. M., Ph. D..... Chemist
HAROLD DE MOTT HUGHES, M. S..... Farm Crops
GILMOUR BEYERS MACDONALD, B. S. F..... Forester
FREDERICK WILLIAM BECKMAN..... Editor Station Bulletin
WM. G. GAESSLER..... Assistant Chemist
CHARLOTTE MARIA KING..... Artist
HARRIETTE KELLOGG, A. M..... Assistant in Botany
MATTHEW LEANDER KING, B. M. E.. Experimentalist in Agricultural Engineering
FRED ERVING COLBURN..... Photographer
LYMAN CRANE BURNETT, M. S. A..... Assistant in Farm Crops
ROBERT LORENZO WEBSTER, A. B..... Assistant in Entomology
LAURENZ GREENE, B. S. A., M. S. A.. Experimentalist in Horticulture
HENRY HERBERT KILDEE, B. S. A.... Experimentalist in Animal
Husbandry
SAMUEL L. JODIDI, B. S., Ph. D..... Experimentalist in Soils
SEYMOUR C. GUERNSEY, B. S. A..... Assistant Chemist
ALFRED A. WELLS, B. S..... Assistant in Soils
ROBINA M. RAE..... Assistant in Station Library
WILLIAM ADAMS LIPPINCOTT..... Assistant in Poultry
PERCY EDGAR BROWN, B. S., A. M..... Experimentalist in Soil
Bacteriology
JOHN MARCUS EVVARD, M. S.. Experimentalist in Animal Husbandry
ROY E. NEIDIG..... Assistant in Chemistry

Iowa Highway Commission

ANSON MARSTON, C. E.....	Director
CHARLES FRANKLIN CURTISS, M. S. A., D. S.....	Director
THOMAS H. MAC DONALD, B. C. E.....	Highway Engineer
JAY BROWNLEE DAVIDSON, B. S., M. E.....	Engineer of Road Machinery
JOHN EDWARD KIRKHAM, B. S. in C. E..	Consulting Bridge Engineer
C. B. McCULLOUGH.....	Assistant Highway Engineer

Agricultural Extension

EDGAR WILLIAMS STANTON, M. S., LL. D.....	Acting President, Ex-Officio
CHARLES FRANKLIN CURTISS, M. S. A.....	Dean of Agriculture, Ex-Officio

AGRICULTURAL EXTENSION STAFF

PERRY GREELEY HOLDEN, M. S., B. Pd.....	Superintendent
E. C. BISHOP, B. S., M. A.....	Schools
RALPH K. BLISS, B. S. A.....	Animal Husbandry
ADDISON H. SNYDER, B. S.....	Soils
NEALE S. KNOWLES.....	Home Economics
GEORGE RAYMOND BLISS, B. S. A.....	Horticulture
E. Y. CABLE.....	Agricultural Engineering
MARTIN LUTHER MOSHER, B. S. A.....	Farm Crops
MURL McDONALD.....	Farm Crops
ARTHUR A. BERGER.....	Animal Husbandry
CHARLES R. BUSH.....	Dairying
MRS. LOUISE HATHAWAY CAMPBELL, B. S.....	Home Economics
ROY ALBERT CAVE, B. S. A.....	Dairy Testing
GEORGE WILLIAM GODFREY, B. S. A.....	Animal Husbandry
MATHIAS ALLEN HAUSER.....	Farm Crops
THEODORE MACKLIN.....	Dairy
EVERETT LLOYD STEWART, B. S. A.....	Soils

Organization and History

The laws of the State of Iowa provide for the management and control of the State College of Agriculture and Mechanic Arts by the State Board of Education. This board consists of nine men nominated by the Governor and confirmed by the Senate. This Board appoints a Finance Committee consisting of three men who give their entire time to the management and control of the three state institutions of Iowa, under such rules and regulations as the State Board of Education may prescribe.

THE SCOPE

The Iowa State College of Agriculture and Mechanic Arts seeks to aid the young men and women in the acquirement of a higher education. Instruction is given in the culture studies and sciences, together with such experimental work as to enable the students successfully to engage in a practical profession. Throughout the several courses, the study of the textbook is supplemented by lectures, discussions, library work, and the practical experimental work of the laboratory. The instruction is not merely theoretical, but also practical, the student verifying and putting into practice in the laboratory the instruction received.

The Iowa State College offers four five year courses and fourteen four year courses leading to the following degrees:

FIVE YEAR COURSES

Five year course in Mechanical Engineering, leading to the degree of Bachelor of Science in Mechanical Engineering, B. S. in M. E.

Five year course in Civil Engineering, leading to the degree of Bachelor of Science in Civil Engineering, B. S. in C. E.

Five year course in Electrical Engineering, leading to the degree of Bachelor of Science in Electrical Engineering, B. S. in E. E.

Five year course in Mining Engineering, leading to the degree of Bachelor of Science in Mining Engineering, B. S. in E. M.

FOUR YEAR COURSES

Courses in Agronomy, leading to the degree of Bachelor of Science in Agronomy, B. S. in Agn.

Course in Dairying, leading to the degree of Bachelor of Science in Dairying, B. S. in Dairying.

Course in Animal Husbandry, leading to the degree of Bachelor of Science in Animal Husbandry, B. S. in A. H.

Course in Horticulture and Forestry, leading to the degree of Bach-

elor of Science in Horticulture, B. S. in Hort., or Bachelor of Science in Forestry, B. S. in For.

Course in Agricultural Engineering, leading to the degree of Bachelor of Science in Agricultural Engineering, B. S. in A. E.

Course in Agricultural Education, leading to the degree of Bachelor of Science in Agricultural Education, B. S. in Agr. Ed.

Course in Veterinary Medicine, leading to the degree of Doctor of Veterinary Medicine, D. V. M.

Course in Mechanical Engineering, leading to the degree of Bachelor of Science in Mechanical Engineering, B. S. in M. E.

Course in Civil Engineering, leading to the degree of Bachelor of Science in Civil Engineering, B. S. in C. E.

Course in Electrical Engineering, leading to the degree of Bachelor of Science in Electrical Engineering, B. S. in E. E.

Course in Mining Engineering, leading to the degree of Bachelor of Science in Mining Engineering, B. S. in E. M.

Course in Ceramics, leading to the degree of Bachelor of Science in Ceramics, B. S. in Cer.

Course in General Science, leading to the degree of Bachelor of Science, B. S.

Course in Home Economics, leading to the degree of Bachelor of Science in Home Economics, B. S. in H. E.

NON-COLLEGIATE COURSES

Two Year Course in Agriculture.

One Year Course in Dairying.

One Year Course in Poultry Husbandry.

SUMMER SCHOOL

Six Weeks Summer School devoted to both collegiate and non-collegiate courses.

WINTER SHORT COURSES

Two Weeks Short Course in Stock Judging.

Two Weeks Short Course in Grain Judging.

The following lectures are given in connection with the Short Courses in Stock Judging and Grain Judging: Horticulture, Forestry, Veterinary, Botany and Agricultural Engineering.

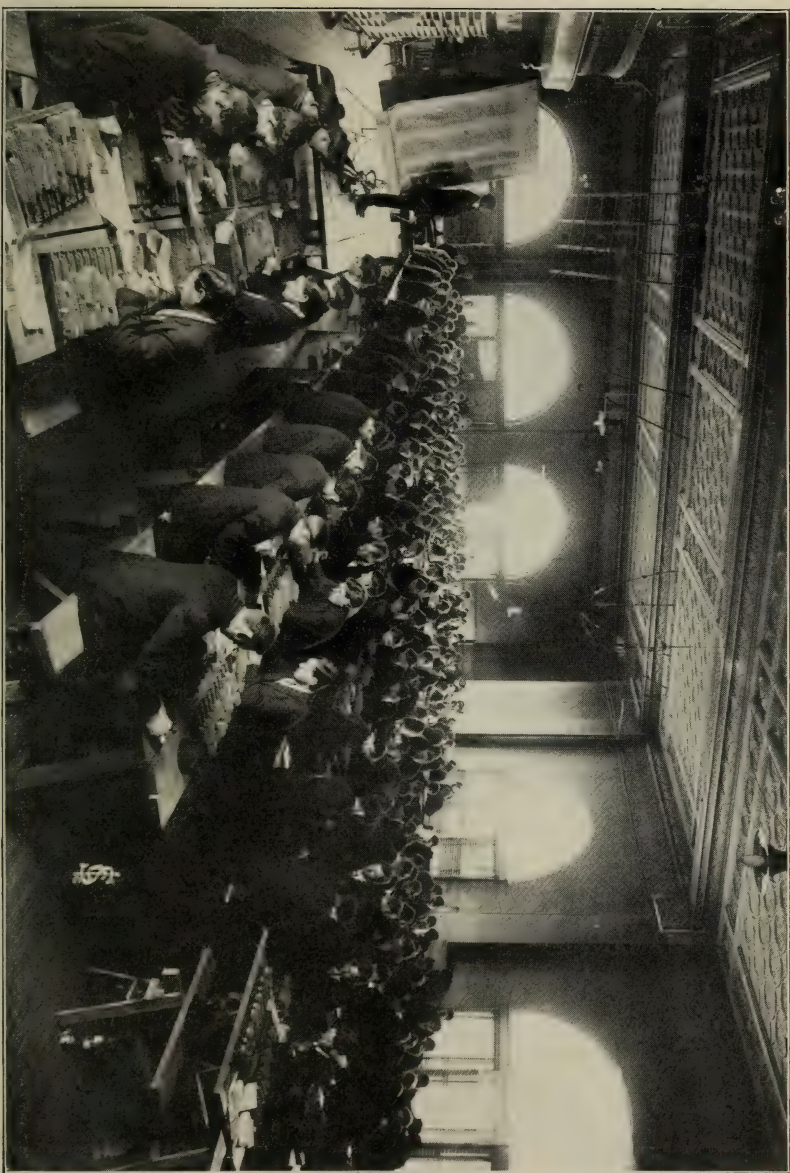
Two Weeks Short Course in Dairying.

Two Weeks Short Course for Buttermakers.

Two Weeks Short Course in Home Economics.

LOCATION

The College occupies a delightful and healthful location upon high, rolling land in the west part of Ames, Story County. Situated at the junction of the north and south branch and the main double-track line of the Chicago & Northwestern Railroad, and connected with all the trunk lines of Iowa, Ames is easily accessible from all parts of the State. An



A CLASS IN CORN JUDGING

electric railway connects Ames and the College with efficient service. The Fort Dodge, Des Moines and Southern Railway (electric), with stations on the campus, gives efficient service to the College, and excellent connections with the following trunk lines in Iowa: At Fort Dodge, with the Illinois Central and Chicago Great Western; at Huxley, with the Chicago, Milwaukee & St. Paul; at Des Moines with the Chicago, Rock Island & Pacific, the Chicago Great Western, and the Chicago, Burlington & Quincy.

Ames is a most desirable town for wholesome college influences. Its people are thrifty, enterprising and cordial. The town has an excellent system of public schools, numerous churches, waterworks, and electric lights, and it also has a good city government. It is an inviting community for families who wish to educate their children and to enjoy a good environment at a reasonable expense. Ames and the College are on very cordial terms, and its citizens seek to promote the efforts of the students and the highest interests of the College.

THE COLLEGE GROUNDS

Of the entire College domain of 1,200 acres, 125 acres are set apart for College grounds. These include the experimental plots, the young forestry plantations, the surroundings of the professors' dwellings, and the central campus with its beautiful winding walks and drives; its trees, shrubbery, and flower gardens; and its large and stately college buildings. The true principles of landscape gardening have been so faithfully observed in the gardening and in the location of buildings and drives as to make the entire campus a large and beautiful park.

BUILDINGS

Thirty-six commodious buildings have been erected by the State for the exclusive use of the various departments of the College, besides the dwelling houses and the buildings for farm stock, machinery, and work. All of these buildings are heated by steam, lighted by electricity, and supplied with pure water.

ACCREDITED SCHOOLS

High schools and academies are placed on the accredited list upon the recommendation of the Board on Secondary School Relations, and the approval of the Faculties of the three State Educational Institutions of Iowa. The Board on Secondary School Relations was appointed by the Iowa State Board of Education and consists of the following members:

P. E. McClenahan, Inspector of Secondary Schools, Des Moines, Iowa.

Herbert C. Dorcas, Registrar, State University, Iowa City.

Herman Knapp, Registrar, State College, Ames.

George S. Dick, Registrar, State Teachers College, Cedar Falls.

All questions with regard to the inspection or relation of the schools to the three state institutions should be addressed to P. E. McClenahan, Inspector of Secondary Schools for the State Board of Education, Des Moines, Iowa.

Admission to the College

All communications with regard to the admission of any student to the College should be addressed to the Registrar. The Registrar will determine the value of all credentials and will notify the applicant of their acceptance. He will also assign the applicant for admission to his position in the course desired. This assignment will be conditioned upon the student's doing creditable work.

Applicants for admission to the freshman class should be at least sixteen years of age.

A student may enter the College at the beginning of either semester. The regular classes begin with the opening in September and the student is urged to commence at that time. The freshman subjects are, however, taught in both semesters. The Freshman work will be of such grade that a graduate of an accredited school can reasonably be expected to be prepared to carry it creditably. The responsibility of maintaining himself in the Freshman class rests, however, upon the student. The College desires to emphasize the importance of thorough preparation, particularly in subjects that are to be continued in College, as for example, Mathematics and English. In these subjects the College has found it helpful to conduct a review for the first two or three weeks of the freshman year. In English, this review will include a rapid but thorough review of grammar followed by essays on simple subjects designed to test the student's command of fundamental principles. This review will be given with the student's first course in college English. At the end of this review students are assigned to sections covering the work which they are fitted to undertake. As without thorough preparation satisfactory progress in advance work is impossible, students are urged to review carefully before entering the College algebra through quadratics, English composition, and grammar. Students desiring admission should examine **THE REQUIREMENTS FOR ADMISSION AND THE METHODS OF OBTAINING THE FIFTEEN UNITS FOR ADMISSION.**

REQUIREMENTS FOR ADMISSION TO THE SEVERAL DIVISIONS OF THE COLLEGE

(Requirements for Short Course Students, see Index).

The requirements for admission are stated in terms of units. An entrance unit is defined as thirty-six weeks of high school work in one subject of study, with five class periods per week each not less than forty minutes in length. Each laboratory period should be at least 80 minutes in length. Students desiring admission to the Freshman year must present fifteen units. Of these, certain are required and the balance may be elective.

UNITS REQUIRED FOR ADMISSION

	Division of Agriculture. Units.	Division of Veterinary. Units.	Division of Engineering. Units.	Division of Science. Units.
Algebra	1½	1½	1½	1½
Geometry, Plane	1	1	1	1
Geometry, Solid			½	
English	3	3	3	3

Not less than 3 semesters in literature; and 3 semesters in composition and rhetoric, and grammar, provided that no credit will be given for grammar if taken in the ninth grade.

History	1	1	1	1
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May include civics and economics. United States History is not to be accepted unless taken within the latter half of the secondary school course. Not more than one-half unit of the required units is to be allowed for civics.

Foreign Language	2	2	2	2
Electives—				
From the following				
list of electives	6½	6½	6	6½

Total units				
for admission	15	15	15	15

Students may be admitted without Foreign Language under the following conditions:

The students must offer all the required units except the 2 in Foreign Language, together with sufficient elective units to make a total of 15.

A student may be admitted who is conditioned 1½ units, but the entrance conditions must be removed within one calendar year after his admission, or before he registers for his second year's work; and he is to be registered **at once** for the work in which he is deficient, **as a part** of the normal amount of work allowed to students.

In case a student presents 13½ to 15 acceptable entrance units, not including any foreign language, he must be conditioned to the extent of two units in foreign language; for such a student cannot make up the full amount of preparatory foreign language in one year. He should be permitted to complete the deficiency during the first half of his sophomore year. This will ordinarily require, if taken in College, extra work to the extent of five hours a week for three semesters. Such extra work will not be credited as a part of the credit hours required for graduation in the several courses.

Students admitted with conditions are not to be permitted to remove

these conditions, within the allotted one year by taking entrance examinations in subjects in which they have been taking college courses for credit.

Students offering Foreign Language for admission units are urged to offer two units in one language, preferably a Modern Language.

In the divisions of Science and Engineering, no Foreign Language course of less than two units will be accepted for required entrance units in language.

In the division of Agriculture and Veterinary Medicine it is not necessary that the required units in Foreign Language be in one language.

List of Elective Units

The following is a list of elective subjects for which entrance credit may be allowed as indicated:

1. Foreign language (not more than a total of 4 units in any one foreign language, including the required 2 units).

- | | |
|-------------|--------------|
| (1) Greek | 2 to 4 units |
| (2) Latin | 2 to 4 units |
| (3) French | 2 to 4 units |
| (4) Spanish | 2 to 4 units |
| (5) German | 2 to 4 units |

2. English (additional to the required 3 units).

- | |
|---|
| (1) Not more than 1 unit; or a total of not more than 4 units,
including the required 3 units. |
|---|

3. History, civics and economics (not more than a total of 4 units in this group, including the required unit, and not more than the maximum credit here indicated in each case).

- | | |
|---|-------------------------|
| (1) Ancient history | $\frac{1}{2}$ to 1 unit |
| (2) Mediaeval and modern history | $\frac{1}{2}$ to 1 unit |
| (3) English history | $\frac{1}{2}$ to 1 unit |
| (4) U. S. history (only if taken within the latter
half of the high school course) | $\frac{1}{2}$ to 1 unit |
| (5) General history (but not in addition to ancient
mediaeval and modern history) | 1 unit |
| (6) Civil government | $\frac{1}{2}$ to 1 unit |
| (7) Political economy | $\frac{1}{2}$ unit |

4. Mathematics:

- | | |
|------------------------|--------------------|
| (1) Solid geometry | $\frac{1}{2}$ unit |
| (2) Plane trigonometry | $\frac{1}{2}$ unit |
| (3) Advanced algebra | $\frac{1}{2}$ unit |

5. Science (not more than a total of $4\frac{1}{2}$ units in this group).

- | | |
|--|-------------------------|
| (1) Physics, not less than | 1 unit |
| (2) Chemistry, not less than | 1 unit |
| (3) Physical geography or physiography | $\frac{1}{2}$ to 1 unit |
| (4) Botany | $\frac{1}{2}$ to 1 unit |
| (5) Zoology | $\frac{1}{2}$ to 1 unit |

(6) Physiology	$\frac{1}{2}$ unit
(7) Geology	$\frac{1}{2}$ unit
(8) Astronomy	$\frac{1}{2}$ unit
(9) Agriculture	$\frac{1}{2}$ to 1 unit

6. Commercial subjects (not more than a total of 2 units in this group):

(1) Advanced arithmetic (only if taken after the completion of the required $1\frac{1}{2}$ units in algebra or in the latter half of the high school course)	$\frac{1}{2}$ unit
(2) Double entry bookkeeping	$\frac{1}{2}$ to 1 unit
(3) Commercial geography	$\frac{1}{2}$ unit
(4) Commercial law	$\frac{1}{2}$ unit
(5) Industrial history	$\frac{1}{2}$ unit

7. Industrial subjects (consisting in subjects in which there should be required for $\frac{1}{2}$ entrance unit either 36 weeks of daily class exercises, each class exercise being not less than 40 minutes in length; or, still better, 18 weeks of daily class exercises, each class exercise being not less than 80 minutes in length):

(1) Freehand or mechanical drawing	$\frac{1}{2}$ to 1 unit
(2) Manual training, i. e. shop work	$\frac{1}{2}$ to 2 units
(3) Domestic science	$\frac{1}{2}$ to 1 unit
(4) Stenography	$\frac{1}{2}$ to 1 unit

(Not more than a total of 2 units in this group).

Note: Credit is not given except upon the passing of the regular entrance examinations, for English grammar, and United States history, when these subjects are given in the 9th grade; nor for arithmetic when this subject is given before the *completion* of the required 3 semesters of work in algebra, or in the latter half of the course.

METHODS FOR OBTAINING THE FIFTEEN UNITS FOR ADMISSION (See General Catalogue).

There are four methods of obtaining the necessary units for admission to the Freshman class:

- A. Admission by transfer from other Colleges and Universities.
- B. Admission by certificate from a fully accredited High School.
- C. Admission by Examination.
- D. Admission on other evidences of Proficiency.

A. Admission by Transfer From Other Colleges and Universities

A student who has entered another College or University of recognized standing and asks admission to this College, must present a certificate of honorable dismissal from the institution from which he comes. He must also present an official statement of the subjects upon which he was admitted to such institution. Provided it appears that the institution

has Entrance Requirements equal with this College and that the certificate shows clearly that the student has been required to meet fully the thirty credits required by this College, he will then be admitted. For the acceptance of standings from other Colleges or Universities to apply as college work in this College, see Acceptance of Advanced Standings.

College Entrance Examinations

Certificates of entrance examinations passed for admission to reputable universities and colleges; and certificates of examination passed under the direction of any of the College Entrance Examination Boards and the Regents of the State of New York; may be accepted as certificates from our own accredited schools are accepted.

Academies and Preparatory Schools

Credits certified from private secondary schools such as academies, seminaries, etc.; and from college preparatory schools, shall be estimated in accordance with the definitions of the entrance unit and on the standard of four years of preparation and residence. College academies or preparatory departments conforming in their organization with the organization of the four-year accredited high school shall be treated as accredited schools, if the colleges themselves are regarded as standard colleges.

B. Admission by Certificate From the Fully Accredited High Schools

Graduates of the fully accredited High Schools of Iowa who meet fully the requirements for admission to the Freshman class, will, upon presentation of the proper Uniform Certificate, be admitted to the College without examination.

Graduates of schools fully accredited by the Colleges of other states which have as high a standard of entrance requirements as this institution, will also be admitted as Freshman upon presentation of certificate of graduation, accompanied by Uniform Admission Certificate.

Superintendents and Principals are urged to send to the Registrar immediately upon the close of the school year, the Uniform Admission Certificate of each graduate intending to enter the College at the beginning of the ensuing College year. If, on inspection, the certificate is found satisfactory, the applicant will be forwarded a certificate entitling him to admission without examination. Uniform Admission Certificates may be obtained by teachers and students upon application. Candidates for admission may apply to the Registrar for the Uniform blank. The Certificate must show the grade of work done and text-books used in the subjects required for entrance, with a definite statement of the year of the High School in which the subject was taken, the number of recitations per week, and the number of weeks the subject was pursued during the High School Course; and it must state that the applicant is of good moral

character and, in the judgment of the subscriber, able to pursue college studies successfully.

If, however, applicants from accredited four-year secondary schools present the superintendent's or principal's certificate showing deficiencies not exceeding $1\frac{1}{2}$ entrance units, together with that officer's statement that they are in good standing in the school from which they come, and that in the subscriber's judgment they are able to pursue college studies successfully, they may be admitted on **condition** that they make up enough credits to bring the number up to fifteen units within one year after their admission.

Diplomas of graduation will not be accepted for entrance unless accompanied by a Uniform Certificate as stated above.

All Uniform Certificates should be filed with the Registrar not later than the second Monday in August or the first Monday in January.

C. Admission by Examination (a suggestive list of examination questions may be obtained from the Registrar).

Students desiring to enter by examination will be given such examinations in any subject required for entrance, upon presentation of satisfactory evidence of their having devoted sufficient time to the preparation of such subjects.

Students desiring to enter by examination will be expected to pass examinations in the required and elective subjects, according to work outlined on pages 35, 36 and 37.

D. Admission on other evidences of Proficiency

Admission from a Non-Accredited School

A student presenting a certificate from an **unaccredited** school may be admitted to collegiate courses by the following plan:

(1) He is to pass entrance examinations in acceptable subjects representing each of the main groups of subjects certified, for half of the number of acceptable credits so certified.

(2) The subjects for examination are to be selected by the college examiner at the time of the examination and irrespective of the choice of the student.

(3) The total number of credits ultimately allowed on the certificate shall not exceed twice the number earned by examination.

(4) The total amount of credit gained in this way, together with **additional** credit for subjects not indicated in the certificate (or subjects so indicated, but not acceptable), if additional credit is needed, shall be at least $13\frac{1}{2}$ units. In case he presents less than fifteen acceptable entrance units he is to be conditioned to the extent of enough units to bring the total number up to fifteen units.

Entrance Examination Periods

Examinations for entrance to College will be conducted at the opening of each semester on the Tuesday and Wednesday preceding classification.

Tuesday.

8 to 10 A. M.—Mathematics. Room 221, Central Building.

10 to 12 A. M.—English. Rooms 1 and 3, Central Building.

1 to 3 P. M.—Language. Room 119, Central Building.

3 to 5 P. M.—Botany. Room 312, Central Building.

Wednesday.

8 to 10 A. M.—Mathematics. Room 221, Central Building.

8 to 10 A. M.—Chemistry. Chemical Hall.

10 to 12 A. M.—History. Room 208, Central Building.

1 to 3 P. M.—Civics. Room 102, Central Building.

3 to 5 P. M.—Physics. Room 212, Engineering Hall.

3 to 5 P. M.—Language. Room 119, Central Building.

The Registrar will arrange for the other examinations required by the candidates for admission.

SPECIAL STUDENTS

Students taking special work in any of the College courses must be at least twenty-one years of age, must give good and satisfactory reasons for desiring such classification, and must furnish satisfactory evidence that they are thoroughly prepared to pursue the work chosen. Permission to take such special course and the subjects included therein depends upon the approval of the President of the College and the Dean or Head of the Department in which the student seeks enrollment.

(1) Permission to take a special course will not be granted to students until they have completed the Freshman year of some one of the courses offered, and then only for a period not to exceed two years except on the recommendation of the Faculty of the division in which the student is enrolled and on approval of the President of the College.

(2) All special students shall pay additional fees for special work of ten dollars for each semester.

Special students are subject to the same rules governing conditions on back work as apply to all other students. A student wishing to change from a regular to a special or irregular course, either in the same or another department, will not be permitted to change from one course to another if he has a condition or a not pass in a subject not common to the two courses; or if he has more than one condition or not pass in subjects common to the two courses. Special students, as well as regular students, are subject to the conditions given under Requirements for Admission.

It is the theory of special classification that students should be particularly strong and well prepared to do thorough work in the studies they elect. A high standard of scholarship will, therefore, be required of all who are thus classified.

Graduates of approved colleges, who are not candidates for a degree, may take special work in this institution under the rules governing special students, without having to complete the Freshman year in any of the college courses. Permission to take such special course and the subjects included therein depends upon the approval of the President of the Col-



THE SOLUS LABORATORY

lege and the Dean or Head of the Department in which the student seeks enrollment.

IRREGULAR COLLEGE STUDENTS

Worthy students of good standing, over twenty-one years of age, not prepared to meet the entrance requirements of the Freshman year may be admitted without examination as irregular college students in the Engineering and the Science Divisions and the Department of Home Economics in the Agricultural Division, not to exceed two years, provided they give evidence of satisfactory preparation to carry such work successfully. Students will be required, however, to present a certificate covering their preliminary education. Irregular students who have not had previous work of collegiate grade will be required to take the first year of their work from Junior College studies. They will be confined in their choice of studies to one division of the College, and shall be subject in selecting such studies to the regulations governing regular college students in that division. During the second year they may be admitted to the Senior College studies in accordance with the rules governing admission to each study or course. These irregular college students will be registered, classified and dealt with, the same, as a regular college student who has entered college with $13\frac{1}{2}$ units.

FEES AND EXPENSES

The entire expenses of a student need not exceed \$350.00 per College year.

Tuition: No charge for tuition is made to the students from the state of Iowa. To the non-residents, a tuition fee of \$25.00 per semester is charged.

Incidental Fee: The regular incidental fee for the semester is \$12.00, but all students who classify during the classification period, Friday, and Saturday, before College work begins, will be charged only \$10.00 per semester.

Laboratory Fees: Laboratory fees at the actual cost of breakage and usage are charged to the students, the Treasurer's receipt for such fee being required before the students are admitted to laboratories. For the amount of the fee in any course the student should refer to the description of courses, under the department in which the course is taught (see index).

Special Student's Fee: All special students shall pay an additional fee for special work of ten dollars per semester (see rule under Special Students).

Board and Room: About one hundred young women can secure rooms in Margaret Hall. Students rooming in this building will be furnished with bed, mattress, rug, chairs, dresser and table. Students will furnish bedding and such other articles as they need.

The price for rent, heat and light will be from \$8.00 to \$14.00 per month according to the size and quality of the room. The room rent will be four months for the fall semester and five months for the spring

semester, each payable in advance at the Treasurer's Office. In case of failure to take the room after making the deposit, the student will forfeit \$10.00.

In case one student wishes to occupy a room, she must pay the full rent. Two persons will divide the rent. The Superintendent of Buildings reserves the right to assign two persons to each room if necessary.

All other students can secure furnished rooms and board in clubs or private families adjacent to the College grounds at from \$4.50 to \$5.00 per week.

The Superintendent of Buildings should be consulted by all new students, concerning rooms and rooming places, that undesirable rooms and houses may be avoided. For sanitary or other reasons the College authorities reserve the right to forbid students from rooming in any particular house.

No group of young women students may establish a "house" or "home" without the full knowledge and approval of the President and the Dean of Women, nor make any definite plans in such direction. No young woman may become a resident of a sorority house until after she is an initiated member of the sorority.

The young women residents of Margaret Hall are required to board at the Margaret Hall boarding club.

Diploma Fee: A diploma fee of \$5.00 is payable before graduation.

Text Books: All text books and stationery may be purchased at the College Book Store at about 20 per cent below the average retail price.

ADVANCED STANDING

Students of other colleges will be admitted to advanced standing in this college under the following conditions:

First, they must present a letter of honorable dismissal;

Second, the entrance requirements to the college must be fully satisfied (see admission from other colleges under Entrance Requirements);

Third, students of other colleges will be admitted and granted such credits as their work will justify. Work of recognized merit that has been taken at Colleges and Universities of good rank and standing will be credited for an equivalent amount of work so far as it applies in any of the courses offered at this College. Students taking up work in this way will consult the Heads of the Departments to ascertain the credits to be allowed. These credits may, at the option of the Heads of the Departments, be conditioned on satisfactory work by the student during the first term in College;

Fourth, standings accepted by any Head of Department from any other College or University, shall be certified to the Recorder as "Accepted from.....College" or "Accepted from.....University," and these acceptances, after being verified by the Recorder, shall be so recorded in lieu of the regular standings;

Fifth, it is required that all credits from other institutions be sent by the proper officers of such institutions, duly certified, to the Recorder of this College, such certificates to include the number of weeks the student has pursued the studies in question and the number of hours' credit received in each term, as well as the portion of the subjects covered;

Sixth, advanced or college credit may be given for extra high school or secondary school work only on the following conditions:

1. The number of units reported and accepted must be in excess of 16.
2. There must be a **rigorous** examination for college credit.

CLASSIFICATION AND STANDINGS

Junior and Senior College: The students are now classified in "Junior and Senior Colleges." The Junior College is composed of all students in the Freshman, and Sophomore years; the Senior College, of all students in the Junior and Senior years.

Amount of Work: The amount of work in each course is expressed in hours, *an hour* meaning one recitation or its equivalent per week throughout the semester. It is considered that one hour's recitation or lecture will require as much time in the preparation, and hence is equivalent to a three-hour laboratory and receives the same credit. Any two-hour laboratory period is equivalent to two-thirds of a three-hour laboratory.

Number of Hours: No student shall be allowed to classify in more hours than are specified in the catalogue for the semester of the course taken unless he has an exceptionally high record in his previous college work. The taking of such additional work is subject to the approval by the Dean under whom the student is classified and the Heads of the Departments in which the student is classified.

In general, students failing in any portion of a term's work will not be allowed to take full classification for the next semester.

Classification: No student shall be admitted to any class or dropped from it, except by authority of the Classifying Officer.

Conflicts: Students shall not classify in conflicting studies without the approval of the Classifying Officer and Heads of the Departments in which the student wishes to enroll.

Standing: All the standings are based on the scale of 100. The passing grade is 75. A student receiving from 60 to 74 per cent inclusive in any course is conditioned, and allowed to make up the condition under the direction of the head of the department.

Back Studies: Students shall be classified in back studies in all cases in which such studies are taught, subject to the first rule under Number of Hours. Any exception to this rule must be for good and sufficient reason, approved by the President of the College and the Dean or Head of the Department in which the student is enrolled.

Changing Course: A student will not be permitted to change from one course to another who has a condition or not pass in a subject not

common to the two courses; or if he has more than one condition or not pass in subjects common to the two courses.

No student shall be considered a candidate for graduation who has not at the beginning of the second semester of the Senior year completed his work to within the maximum number of hours regularly allowed in his course for that semester. If the uncompleted work is not offered in the second semester, it shall be passed and reported to the Recorder not later than April 1st.

EXAMINATIONS IN BACK WORK

Examinations for back work for matriculated students will be conducted at the opening of each semester, on the Tuesday and Wednesday preceding classification days.

Tuesday

- 8-10 A. M.—Farm Crops....Farm Crops Lecture Room, 307 Hall of Ag.
- 8-10 A. M.—Mining Engineering.....Room 306, Engineering Hall
- 8-10 A. M.—Zoology.....Zoological Lecture Room
- 10-12 A. M.—English.....Rooms 1 and 3, Central Building
- 10-12 A. M.—Civil Engineering.....Room 312, Engineering Hall
- 1- 3 P. M.—Mech. Engineering.....Rooms 204 and 205, Eng. Hall
- 2- 4 P. M.—History.....Room 208, Central Building
- 3- 5 P. M.—Public Speaking.....Room 308, Central Building
- 3- 5 P. M.—Electrical Engineering.....Room 207, Eng. Hall

Wednesday

- 8-10 A. M.—Horticulture.....Hort. Lecture Room 208, Hall of Ag.
- 8-10 A. M.—Chemistry.....Room 29, Chemical Hall
- 8-10 A. M.—Mathematics.....Room 221, Central Building
- 8-10 A. M.—Animal Husbandry—A. H. Lecture Room 117, Hall of Ag.
- 10-12 A. M.—Economics.....Room 222, Central Building
- 10-12 A. M.—Dairying.....Dairy Building
- 10-12 A. M.—Botany.....Room 312, Central Building
- 1- 3 P. M.—Civics.....Room 102, Central Building
- 1- 3 P. M.—Mech. Engineering.....Rooms 204 and 205, Eng. Hall
- 1- 3 P. M.—Home Economics.....Home Economics Building
- 2- 4 P. M.—Modern Language.....Room 119, Central Building
- 2- 4 P. M.—Agricultural Eng...Agr. Eng. Lecture Room, Agr. Eng. Hall
- 3- 5 P. M.—Soils.....Soils Lecture Room 8, Hall of Ag.
- 3- 5 P. M.—Physics.....Room 207, Eng. Hall

DEPARTMENTS MAINTAINED

- | | |
|---------------------------|--------------------------|
| Agricultural Chemistry, | Home Economics, |
| Agricultural Education, | Horticulture, |
| Agricultural Engineering, | Literature and Rhetoric, |
| Agricultural Journalism, | Mathematics, |
| Agronomy, | Mechanical Engineering, |
| Animal Husbandry, | Military Science, |
| Bacteriology, | Mining Engineering, |

Botany,
Chemistry, General and Applied,
Civil Engineering,
Dairying,
Economic Science,
Electrical Engineering,
English,
Farm Crops,
Forestry,
Geology,
History,

Music,
Modern Languages,
Physics and Illuminating Engin'ing,
Psychology and Ethics,
Public Speaking,
Science and Agriculture,
Soils,
Veterinary Medicine,
Zoology.

GOVERNMENT

The relation of our College buildings, and the nature of the exercises, complicated as they are, by laboratory work, shop practice, and labor, make order, punctuality, and systematic effort indispensable. The institution, therefore, offers no inducement to the idler or the self-indulgent. All who are too independent to submit to needful authority, too reckless to accept wholesome restraint, or too careless to take advantage of their opportunities, are advised not to come. The discipline of the College is confined mainly to sending away those who prove, on fair trial, to be of this class. The final decision of all cases of discipline shall rest with the President of the College except when he delegates such power in particular cases to the Deans or to some one of the standing committees of the faculty.

MANUAL LABOR

The following regulations in regard to manual labor have been adopted by the Board of Education:

1. The manual labor of students is divided into two kinds: viz., un-instructive labor, which shall be paid for in money; and instructive labor, which shall be compensated by the instruction given and the skill acquired.

2. Uninstructive labor shall comprise all the operations in the workshop, the garden, upon the farm, and elsewhere, in which the work done accrues to the benefit of the College, and not to that of the student. Instructive labor shall embrace all those operations in the workshop, museum, laboratories, veterinary hospital, experimental kitchen, upon the farm, garden and experimental stations, in which the sole purpose is the acquisition of knowledge and skill.

3. Students shall engage in instructive labor in the presence of the professor in charge, and under his instruction according to the statement made in each of the courses of study.

The compensated labor furnished by the Divisions of Agriculture, of Veterinary Medicine, and of Engineering, is given by each to its own students and is eagerly sought. The "details" of compensated labor supplied by the needs of the various departments are given to the most faithful and meritorious students in each department. Uninstructive

labor is paid for according to its value to the College, but no student should expect to pay the main part of his expenses by labor while here. The College cannot furnish the work, and, even if it could, the student's time is *needed chiefly for study*. Still, many worthy and industrious students pay a considerable part of their expenses by labor, over \$4,000 being paid out by the College thus each year to students and graduate assistants.

GRADUATING THESIS

All candidates for graduation in the Engineering and Agricultural courses are expected to present a satisfactory thesis.

The subjects for theses shall be selected under the direction of the professor in whose department they are written, and submitted to the Thesis Committee, with signed approval of the professor, on or before the first Monday in October.

It is expected that each thesis shall represent an amount of work equivalent to at least one exercise per week through the Senior year; that it shall show the result of the student's personal study or investigation and be throughout original in matter and treatment so far as the nature of the subject will permit; that it shall be prepared under the supervision of the professor in charge, the student making frequent reports of progress and having an outline of matter ready for approval by the first week of the last semester.

The complete thesis shall be submitted to the Thesis Committee on or before May 25th.

COLLEGE HOSPITAL

The actual sanitary condition of the College is excellent. The buildings are situated on high ground with good natural drainage. The water supply is exceptionally pure and abundant. The sewer system and sewage disposal plant are the best that modern sanitary engineering can devise. Nevertheless in this, as in other like institutions, whose students are drawn from a wide territory, various diseases are brought by the students themselves. In order to control epidemics and properly to care for other cases of illness or injury, a hospital is provided. This hospital is under the charge of the College Physician, assisted by a professional nurse, a competent housekeeper, and a student hospital steward.

The expenses of the hospital are defrayed from a fund accruing from the fees paid by students. The privileges of the hospital are extended to all students, provided: 1st, that the physician shall be paid for calls at their residences; and, 2d, that the usual fee shall be paid within the first ten days of the student's arrival. Persons not making the deposit will be admitted to the hospital upon the basis of \$10.00 per week, within the discretion of the College physician. All students who pay the regular fees are insured medical attendance, nursing, and medicine, in illness or accident; and consultation and medicine for minor ailments in accordance with the regulations herein published. The charges named are based upon the probable actual cost of medical attendance and hospital service, and the fund created is carefully devoted to these purposes.

The College can not assume any liability beyond the extent of the fund so created. The hospital has proved to be a great blessing to the students.

The following regulations apply to the privileges of the hospital:

1st. Students entering the hospital shall be charged \$3.00 per week for board, room, light, and heat. But for any time in excess of three consecutive weeks per term spent in the hospital, an additional charge above that mentioned shall be made of \$4.00 per week.

2d. In case a special nurse or physician is employed, the expense shall be borne by the particular patient, the selection of such nurse or physician to be approved by the College physician.

3d. The College assumes no responsibility whatever in case of small-pox; nor shall the privileges of the hospital be extended to such cases.

4th. The President and the College physician may require of students entering the college a certificate of a reputable physician showing successful vaccination.

5th. The College physician is authorized to exclude from the College dormitories and recitation rooms any person afflicted with a contagious disease.

COLLEGE LIBRARY

The College Library, consisting of over 35,000 volumes and of about 40,000 pamphlets, is chiefly a library of reference, containing standard and technical works bearing particularly upon the lines of study pursued in the College. Magazines, periodical literature bearing upon the special work of the students, and daily papers are furnished for the use of the students. The reading room of the library is open eleven and one-half hours daily except Sunday, when it is open three hours. Personal assistance will be given by the librarian and her assistants to any who desire help in reference work.

A few years ago the College received by bequests about 1,500 volumes pertaining to Engineering and Economics from the library of the late Geo. W. Catt. This Engineering Library, with that section of books from the general collection, has been made a Departmental Library, located in Engineering Hall. An Agricultural Library has been established, also, in the New Hall of Agriculture.

RELIGIOUS LIFE AT THE COLLEGE

ORANGE HOWARD CESSNA, CHAPLAIN

JOHN P. CLYDE, GENERAL SECRETARY, Y. M. C. A.

NELLIE GOSS, GENERAL SECRETARY, Y. W. C. A.

Although we have here a state school, and hence one non-sectarian, the College life is dominated by religious influences.

The Young Men's and Young Women's Christian Associations, Bible Study Classes, and Mission Classes, consisting of members from both faculty and student body, have a helpful influence not only upon the religious but also upon the social life of the College. The members of the Association assist in the reception of the new students and in the maintenance of religious work.

The work of each Association is under the direction of a general secretary. These two Associations are now located in their new home, "Alumni Hall," which was constructed at an expense of \$60,000.00, by funds donated by the alumni, students, instructors, citizens, and friends. This home is the center of the religious and social life of the College and as a building for such purposes it is not excelled in the West.

The faculty and students assemble daily in the Chapel at 9:40 A. M. for public worship. On each Sunday morning at 10:45, Chapel exercises are conducted by some prominent clergyman invited for the occasion. In all these services, the object is to emphasize the principles of morality and of Christian religion.

There are ten different denominational churches in Ames, all of which are closely in touch with the students and cordially invite them to take part in all religious services.

ALUMNI ASSOCIATION

The Alumni Association of the Iowa State College was organized in 1876. Its purpose is to promote the highest interest of the institution and to increase friendship and sympathy among students and alumni.

The present officers of the Association are: Honorary President, E. W. Stanton, '72, Ames, Iowa; President, J. S. McGovern, '81, Missouri Valley, Iowa; Secretary, Harry F. Brown, '98, Ames, Iowa; Treasurer, Mrs. Julia Wentch Stanton, '88, Ames, Iowa; and Business Manager of *Alumnus*, Ward M. Jones, '97, Ames, Iowa. The annual meeting and banquet are held on Wednesday and Thursday of Commencement week. A local association was organized in April 1903, in order to arrange for the annual meetings and to keep the alumni in close touch with one another. Active associations exist in Des Moines, California, Colorado, Washington, D. C., Pittsburg, Chicago, St. Louis, Seattle, Canada, and Idaho.

Alumni Hall adds much to the Association, as it affords a place where the alumni may meet when visiting their Alma Mater.

COLLEGE PUBLICATIONS

1. Catalogue, published in February, and giving general information about the College and its several departments.
2. College Compendium, an illustrated catalogue of the school.
3. Special announcements of the Agricultural, Veterinary, and Engineering divisions, and of the Short Course and Good Roads School, one bulletin being published each month.
4. Bulletins, recording the results of experimental studies carried on by the Agricultural and the Engineering Experiment Stations.

STUDENT AND ALUMNI PUBLICATIONS

1. The Student, a semi-weekly paper, published by a staff elected from the student body and devoted to the recording of such matters as pertain to the interest and welfare of the school.
2. The Bomb, an annual published by the Junior Class.



MEDALS WON BY STUDENTS OF DAIRY DEPARTMENT
IOWA STATE COLLEGE



DAIRY BUILDING, IOWA STATE COLLEGE

3. Iowa Agriculturist, published monthly by the Agricultural Club of the Iowa State College.
4. Iowa Engineer, published bi-monthly by the Engineering Association.
5. The Alumnus, a monthly publication, devoted to and published by the Alumni Association.

LITERARY SOCIETIES

The work of the eleven literary societies serves not only to supplement the social and literary work of the College, but also to aid the student in securing that training so necessary to enable one to appear before an audience, that training which every student needs and which cannot be secured in the class room alone. It is the purpose of the officers of the College to keep each Friday evening open that the work of these societies may go on without interruption. Every student is invited, even urged, to join one of these societies.

FORENSIC LEAGUE

The Forensic League is an organization composed of two representatives from each of the eleven Literary Societies of the College, and three faculty members representing the Public Speaking, English, and Economics Departments respectively. The function of this organization is to manage the Forensic interests of the College. These interests include intersociety and intercollegiate debates, and intersociety and intercollegiate oratorical contests, intersociety declamatory contests, joint public programs and Literary Society graduation exercises. There are intersociety debates each semester calling out four students from each society. During the fall semester a dual debate is held with the Iowa State Teachers' College, calling out six debaters. The triangular intercollegiate debate with Drake University and Iowa College held during the spring semester also calls out six students to represent the Iowa State College.

Intersociety oratorical contests are held each fall semester and declamatory contests each spring semester, each society having one representative. The winner in the intersociety oratorical contest represents the College in the annual state intercollegiate oratorical contest.

MUSICAL ORGANIZATIONS

The College maintains a Choral Society (membership being open both to students and to citizens of Ames), a College Choir, a Glee Club, and a Ladies' Glee Club, all of which give frequent concerts and recitals. The musical organizations are under the supervision of the Director of Music.

A College Band of thirty-two pieces is maintained under the instruction of Charles L. Mundhenk, a member of the Iowa State Band of 1893. This band furnishes music in connection with the Military Department and also for all athletic and student assemblies.

Graduate Courses

The Iowa State College offers the Master's degree in Agriculture (M. S. in special line in Agriculture) to Bachelors of Science in Agriculture who are graduates of this College or to others offering equivalent courses of study, the degree of Master of Science (M. S.) to Bachelors of Science who are graduates of this College or of other colleges offering equivalent courses of study, the degree of Master of Science in Agricultural Engineering (M. S. in A. E.) to Bachelors of Science in Agricultural Engineering who are graduates of this College or of other Colleges offering equivalent courses of study, and also Professional degrees in Engineering.

MASTER'S DEGREE

The opportunity for resident study after graduation is a privilege granted only upon the recommendation of the President with the advice and consent of the Committee on Graduate Study and the professors in charge of the departments in which the studies are to be pursued.

The candidates shall spend at least one academic year in residence. If only one year is spent in residence, the candidate shall devote his entire time to his graduate studies, except in cases where work previously done *in absentia* is accepted at the beginning of the student's residence by the Professor in charge of the major subject. Such *in absentia* work shall constitute not more than one-half of the required work. In the case of graduates of this college, temporary leave of absence for special study elsewhere may be granted during the year's residence. In order to be entitled to his degree, the candidate must meet within four years the requirements existing at the time of matriculation, otherwise he must complete any additional requirements which may be in force at the time of his final examination.

Two lines of work shall be selected, designated as major and minor studies, the former to be given two-thirds and the latter one-third of the time. The major study shall be research work, the results of which shall be incorporated in a thesis. The major and minor studies shall be so selected as to support and strengthen each other. No under-graduate study shall be selected as a major study. Under-graduate studies may be taken for part of the minor work only with the approval of the Committee on Graduate Study, and the heads of the departments in which the work is to be done. The candidate shall have a reading knowledge of French or German.

Application for graduate study, specifying the departments in which the major and minor subjects are to be taken, shall be filed with

the President within four weeks of the beginning of the first term's resident work, which, in all cases, shall be not later than October 1st, next preceding the commencement at which the degree is to be granted.

A detailed outline of the work to be done in the major and minor subjects approved by the heads of the departments in which the work is to be taken shall be filed with the Committee on Graduate Study, within eight weeks of the opening of the semester in which resident work is begun.

The candidate for the master's degree shall apply in writing for examinations not later than May 1st; and such examinations shall be given not later than May 15th.

Graduates of other institutions desiring to become candidates for graduate degrees in this institution shall be required to show to the Committee on Graduate Study evidence of under-graduate work equivalent to the corresponding course in this institution, and if any deficiency appears in the subjects elected for graduate work, to make up such deficiency.

Candidates for advanced degrees are expected to appear on the Commencement stage to receive such degrees.

FEES

A matriculation fee of fifteen dollars (\$15.00) is charged to all graduate students. This fee is paid at the Treasurer's Office and the receipt shown to the chairman of the Graduate Committee at the time of first registration.

Laboratory fees are charged in each laboratory for the material used, the amount being arranged with the Head of the Department.

Diploma fee for Master's Degree or Professional Degree is five dollars (\$5.00).

GRADUATE WORK IN AGRICULTURE

AIMS AND METHODS

It is the aim of the College of Agriculture to furnish facilities for advanced study commensurate with the demand. By means of this advanced work the College seeks to awaken in the minds of capable men and women an appreciation of research and the advancement of learning, to the end that they may effectively aid, not only in the teaching of agriculture, but also in extending the boundaries of agricultural knowledge. Nearly all of the best positions open in agricultural research and instruction work now require graduate training.

The College of Agriculture aims to give advanced instruction of a high character in each of its departments. No set courses of study leading to the Master's degree are provided, but each candidate for this degree pursues an independent line of special research, original in character, outlined with the advice of the professors, and carried out under their direction. Seminars are largely employed and especial efforts

are made to bring the graduate student into contact with the research problems of his department of study. To this end capable students often take a part in the investigation work of their instructors.

EQUIPMENT

The College of Agriculture is well equipped for Graduate work. Each of the departments is provided with commodious laboratories which are fitted up with apparatus and equipment of the most approved design. In addition, large herds and flocks, a large number of field plots devoted to soil and crop investigations, and extensive orchards and plant breeding grounds offer the student excellent facilities along Animal Husbandry, Agronomy and Horticultural lines. The Dairy and Agricultural Engineering departments have buildings and equipment which are unsurpassed for work in their respective fields. A splendid library has recently been installed in the new Hall of Agriculture which provides unusual facilities for graduate students. Within the past few years hundreds of valuable books containing the results of the most noted foreign investigators have been added to this library.

In the following pages will be found grouped together the lines of agricultural work which are offered graduate students.

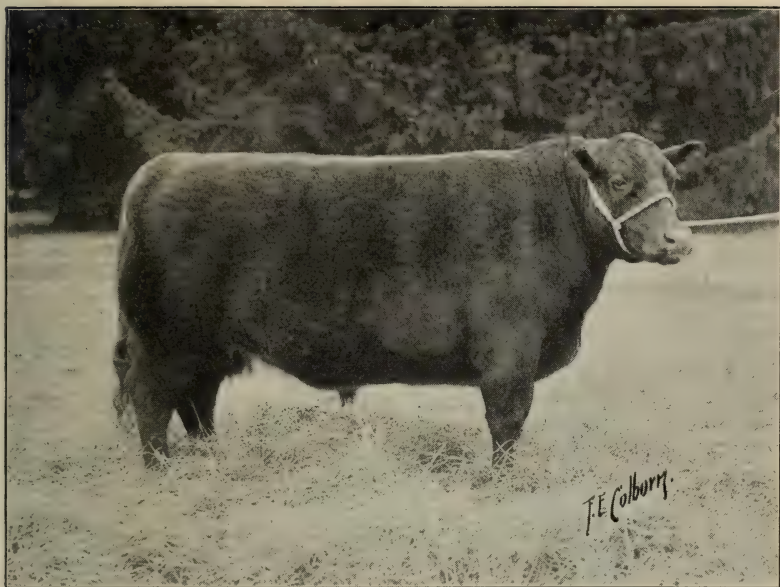
FARM CROPS

Graduate work in Farm Crops comprises investigation of biological phenomena of growing crops, with a view to recognizing the operation of the laws of plant breeding. It also includes an opportunity for investigation of station methods and for putting them into practice.

Cereal Breeding: An opportunity is given through the records of the Experiment Station, and through actual work in progress on the experimental field, to investigate the operation of the laws of plant breeding as applied to farm crops. This investigation will include an extended study of correlations of characters in growing strains of corn and small grain. A study of the transference of characters in generations of plants of hybrid origin gives an excellent opportunity for tracing Mendelian principles.

Experiment Station Methods: Special opportunity for practice in experiment station methods of conducting scientific tests of farm crops are offered on the extensive experimental grounds of this institution. Besides making a study of the methods in vogue at this station, an opportunity is given for an investigation of the methods in operation at other leading experiment stations of this country.

General Crop Problems: Unsolved problems of growth and the harvesting and storage of the several cereal crops offer inviting lines for valuable research. The commodious laboratories of the Farm Crops Department, equipped with the best apparatus available, enables the investigator in this line to conduct satisfactory, scientific research into the many important unsolved problems.



VICTOR—INTERNATIONAL GRAND CHAMPION, 1911



INTERNATIONAL CHAMPION PEN OF BARROWS, 1911

SOILS

Graduate work is offered in Soils which prepares the student for special work in the United States Bureau of Soils or in Colleges and State Experiment Stations. The work may be a continuation of work taken as an under-graduate in this College or of any line of soil study which has fitted the student to take up advanced work.

The graduate student will find excellent opportunities for investigations in soils along the following lines:

Soil Physics: Research in special subjects bearing on the physical characteristics of soils and their relation to crop production.

Soil Fertility: Special investigation of the factors which control the productive capacity of soils.

Soil Bacteriology: Original investigations of important problems in Soil Bacteriology, the department offering unusual opportunities along this line, especially in connection with the humus investigations which are now in progress.

Research in Soil Management: Investigations of the principles governing successful systems of soil management. Special studies relating to the management of particular soils such as gumbo, peats, sands, and alkali soils.

Seminar: Special investigation bearing on selected lines in Soils. The preparation and presentation of papers for discussion by the class.

DAIRYING

Graduate work in Dairying can be taken along any one of the following lines:

Buttermaking: The large, well equipped factory offers abundant opportunity for anyone desiring to specialize along this line. It gives facilities for advanced work in cream ripening, pasteurizing, starters, churning, separating, etc.

Creamery Management: Under this head investigational work is done along such lines as: cost of manufacture, economical methods of purchasing cream and supplies, disposal of the by-products of the factory, and improved methods of creamery accounting.

Cheese Making: The large, well equipped cheese room and cold storage rooms connected with it make a very complete laboratory in which to carry on investigational work in comparing different methods of making, storing and curing various kinds of cheese.

Testing Dairy Products and Milk Inspection: These subjects offer a great field for research, including comparisons of quick methods of analyzing the various dairy products with the well established method and a study of improved methods of testing for preservatives and adulterations.

Advanced Work in Dairy Bacteriology: This work will consist of a Laboratory study of such a problem as the students themselves may

select, together with a survey of the literature along this line. If it is so desired, the work can be of a research nature.

ANIMAL HUSBANDRY

Graduate work in Animal Husbandry may be taken along any of the following lines:

Animal Nutrition: Because of the large number of horses, cattle, sheep and swine-feeding experiments which are being conducted on the College Farm, the opportunities for doing research work in this line are unequalled.

Animal Breeding: Includes special work along new and original lines pertaining to principles underlying Animal Breeding.

Study of Breeds: With not only typical specimens, but also, in most cases, complete breeding herds of almost every recognized breed of live stock on the continent, the graduate student is offered unexcelled opportunity for studying breeds adapted to Iowa conditions.

Stock Judging: For this work, all the various market types of animals and good representatives of pure breeds are available. These are carefully studied on foot, then slaughtered for a block test and the exact percentages and values of various cuts determined.

Practical Management of Stock: This consists of a study and investigation of the methods employed on the best managed stock farms and breeding establishments in the United States, Canada, Great Britain, and other countries. Students are thus prepared to manage stock farms.

POULTRY HUSBANDRY

Because of the newness and great scope of the field, Poultry Husbandry offers many opportunities for doing valuable research work. Unexcelled opportunities are offered for the common application of training which the student may have received in embryology, bacteriology, physics, zoology, entomology, farm architecture, etc. Some of the lines along which the student may work are:

Breeding: Because of the shortness of generations and the widely varying characteristics in color and shapes of varieties, poultry offers unexcelled opportunities for study of unit characters in crossing and in applying the laws of heredity. Work may also be done along the lines of breeding for meat type and increased egg production.

Feeding: Comparative studies are made of different rations for laying and breeding stock, rearing and fattening, or finishing. Comparison is made of breeds in regard to gains made on certain rations. Tests are also made of the effect of feeding on color of feathers or composition of flesh and eggs.

Housing: The work covers comparison of glass front, curtain front, or combination glass and curtain front houses; a comparison of large and small flocks; a study of colony houses and of poultry house sanitation.

Incubation: This branch of the industry is in great need of investigation because of its vast importance and the little knowledge we now have of its laws. Such lines of work could be taken up as: effect of moisture or non-moisture methods on the fertility of eggs and the vitality of chicks; value of carbon dioxide in incubation; study of natural methods; loss in weight in incubation; change in the structure and density of the shell; selection of chicks as they hatch for constitutional vitality; difference in incubation management for eggs of different classes of poultry.

Brooding and Rearing: Brooding in large versus small flocks; natural versus artificial brooding; study of brooder diseases; effects of temperature on health and growth of chicks—all these are part of the course.

Poultry Diseases and Pests: This includes a study of cholera, sorehead, black head, roup, and other poultry diseases with a view to prevention and cure, and also a study of lice, mites, rats and other pests, with a view to their extermination.

HORTICULTURE AND FORESTRY

Graduate students find here opportunity for investigation in Horticulture and Forestry in the following subjects. Work in Forestry is offered for minor subjects only:

Plant Breeding: The investigation of principles and methods of plant breeding. The plant breeding work of the Iowa Experiment Station is continually developing an abundant supply of material for the study of heredity, variation, and selection, particularly with the apple.

Plant Propagation: The greenhouses, garden, and orchards are available for investigations concerning the principles and technique of plant propagation.

Pomology: A special study of horticultural species with reference to their original geographical distribution, to their variation under cultivation, and to the development of distinct types and economic importance.

Research: Problems for horticultural investigation other than those suggested above, undertaken in special lines for which the students may be best prepared.

Forest Botany, or Dendrology: Systematic and biologic forest geography.

Silviculture: The methods of producing a forest crop and of influencing its progress.

Wood Technology and Timber Physics: The structural and physical characters of woods, with the application of wood in the arts, with its requirements and working properties, and with the use of minor and by-products.

Forest Economics: A study of the relation of forests to climate,

soil, water, health, ethics, etc. This is a study of commercial peculiarities and of the positions of forests and forestry in political economy.

Forest Mensuration: Methods of ascertaining volumes and rates of growth of trees and stands of determining yields.

AGRICULTURAL ENGINEERING

Students who are prepared to do so may take up graduate work along any of the several branches of agricultural engineering. This advanced work will be especially helpful to those who expect to teach agricultural engineering in the colleges or secondary schools. It should also be especially helpful to those who expect to engage in practical or commercial agricultural engineering work.

1. **Farm Machinery:** The construction, efficiency and utility of farm machines. The Department of Agricultural Engineering has an extensive equipment of agricultural machinery.

2. **Farm Power:** A study of the economy and efficiency of steam and internal combustion engines and tractors. Also a study of the horse as a source of power.

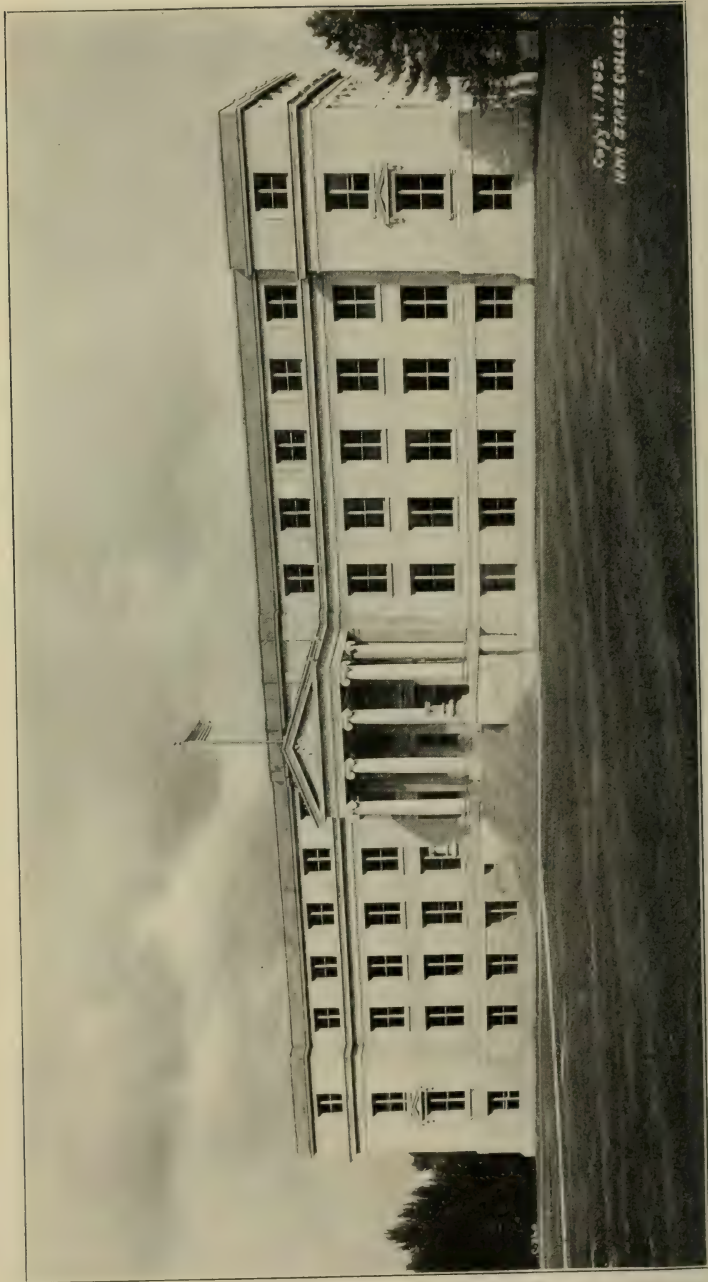
3. **Farm Structures:** The location, design, construction of farm structures, materials of construction, specifications and contracts.

4. **Drainage:** Drainage engineering methods and practice.

5. **Irrigation:** Irrigation practice and irrigation engineering methods.

6. **Road Construction:** The construction, cost and maintenance of rural highway.

7. **Farm Sanitation:** The lighting, heating, and ventilating of farm buildings, as to water supply and sewage disposal.



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IOWA STATE COLLEGE.

HALL OF AGRICULTURE

Division of Agriculture

CHARLES FRANKLIN CURTISS, DEAN

SPENCER AMBROSE BEACH, VICE-DEAN

The division of Agriculture offers to its students work in any of the following courses:

Course in Agronomy.

Course in Dairying

Course in Animal Husbandry.

Course in Horticulture and Forestry.

Course in Agricultural Engineering.

Course in Agricultural Education.

Course in Home Economics.

These courses are so arranged as to furnish a good foundation from which a student may become either a successful farmer or may develop into a specialist in one of the many branches of the agricultural industry. The department offers short as well as the regular four year courses, the difference being due largely to the degree in which the student wishes to specialize in any line of work. The farm as it is usually conducted is a union of many divisions of industry, and the shorter course confines itself to laying a foundation that will secure success in all of these, while the longer course seeks to direct the student into that line which will call forth and centralize his special ability and at the same time enable him to meet the variety of conditions that under all circumstances surround a successful life.

Past experience with these courses shows that they have met with more than usual success in attaining their objects; as the shorter course has been productive of many successful farmers, and the longer course has been usually successful in developing better farmers and more capable men in practical life and also in securing for our graduates prominent positions in the agricultural faculties of other colleges.

In the courses in practical agriculture, a field of work which is unsurpassed by any other college in the United States is open to our students. The national government gives to the college about thirty-five thousand dollars annually for original experimentation and instruction in agriculture and the sciences related to this industry. This, supplemented by liberal state aid, enables the College authorities to make the fields and the barns veritable laboratories of extensive and most practical investigation and observation. The range is from the soil, which produces, through all of

its natural characteristics, to whatever is grown in agriculture from germ to finish.

The farm, consisting of 1,200 acres of rolling prairies, bottom and woodland, is stocked with good representatives of six breeds of horses, seven breeds of cattle, seven breeds of sheep and six breeds of hogs. These animals are used in class illustration and for the various experiments in breeding and feeding for milk, meat, wool, growth and maintenance, conducted by the Experiment Station as a department of the College. All the crops are grown for some educational purpose; all the animals are fed by rule and system, and the result of their management reported upon and used in class work.

Three commodious, well-lighted stock judging pavilions have recently been constructed, into which live animals are brought in the presence of the teacher and the class for careful study and intimate knowledge. An experimental barn with the recent and most approved methods of stalls, feeding and ventilation, is devoted exclusively to the original work of animal husbandry and agronomy, the work ranging over all the questions of breeding and maturing domestic animals.

The work of this department is designed to teach the sciences that underlie practical agriculture, and sufficient English, literature, mathematics, history, and other supplementary studies to sustain both scientific and practical agriculture and to develop the agricultural students to the level of the educated in any profession. Special attention is given to the improved methods in all the various operations of farming, farm building, use of tools and machinery, and management of all kinds of stock and crops. The instruction embraces not only the principles, but also the practices of agriculture.

AGRICULTURAL COURSES

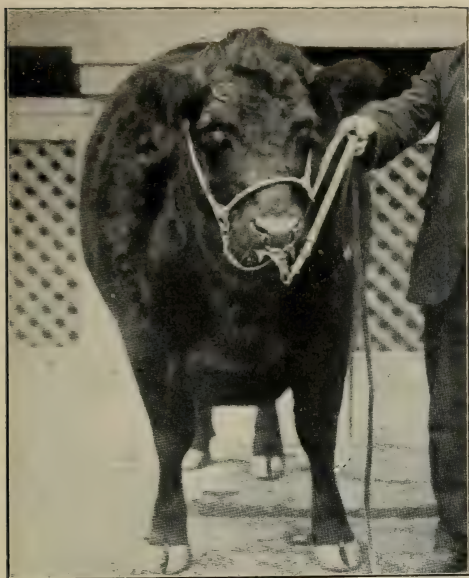
All students classified in the courses in Agronomy, Dairying, Animal Husbandry and Horticulture will take the same work until the beginning of the Sophomore year, when the selection of the desired course will be made by the student. Students classified in the courses in Agricultural Engineering and Agricultural Education will take the Freshman work as shown in the list of studies given for those courses.

*Freshman Year

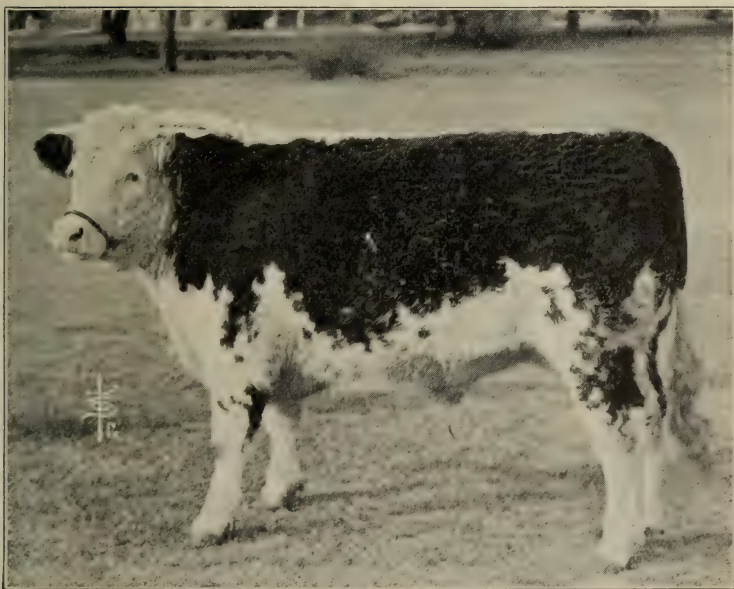
FIRST SEMESTER

		Required Semester Hours
Agricultural Chemistry 21,	General Chemistry	4½
Agricultural Engineering 1 or 2,	Shop Work	1½

* Freshmen who show deficient preparation in Mathematics may be assigned by the Dean of the Junior College and the Dean of Agriculture, to a special class, with one hour more work than indicated above, and in case of clear indication of failure even with this arrangement they will be dropped from the Freshman work until they have given proof of sufficient preparation to enable them to carry the work successfully.



BLACK ROCK—INTERNATIONAL GRAND CHAMPION OF 1905



DEFENDER--INTERNATIONAL GRAND CHAMPION OF 1906

Animal Husbandry 1,	Market Types of Cattle and Sheep	2
Botany 61,	Morphology	1 $\frac{2}{3}$
Farm Crops 1,	Corn Growing and Judging	2 $\frac{2}{3}$
Horticulture 3,	Orcharding	2 $\frac{2}{3}$
Mathematics 17,	Algebra and Trigonometry	3
Veterinary 56,	Anatomy of Domestic Animals	1
Military 1,	Military Drill	R
Library 1,	Library Instruction (4 hours during semester)	R
	Total semester hours	18 $\frac{2}{3}$

SECOND SEMESTER

		Required Semester Hours
Agricultural Chemistry 23,	General Chemistry	4 $\frac{1}{3}$
Agricultural Engineering 1 or 2,	Shop Work	1 $\frac{1}{3}$
Animal Husbandry 2,	Market Types of Dairy Cattle, Horses and Swine	2
Dairying 12,	Farm Dairying	2 $\frac{2}{3}$
Farm Crops 2,	Small Grains	2 $\frac{2}{3}$
Forestry 1,	Farm Forestry	2
Physics 205,	Mechanics, Heat and Light	3
Military 2,	Military Drill	R
	Total semester hours	18

Department of Agronomy

WILLIAM HENRY STEVENSON, PROFESSOR

HAROLD DE MOTT HUGHES, PROFESSOR OF FARM CROPS

PERCY EDGAR BROWN, ASSISTANT PROFESSOR OF SOIL BACTERIOLOGY

ROY EUGENE SMITH, ASSISTANT PROFESSOR OF SOILS

WILLIAM ROY HECHLER, INSTRUCTOR IN FARM CROPS

WILLIAM ALLEN LINTNER, INSTRUCTOR IN FARM CROPS

LEE W. FORMAN, INSTRUCTOR IN SOILS

ADDISON H. SNYDER, SOIL EXTENSION WORK

MARTIN LUTHER MOSHER, FARM CROPS EXTENSION WORK

MURL MCDONALD, ASSISTANT, FARM CROPS EXTENSION WORK

Agronomy is the science of the Field and its crops. It treats of Farm Management, the application of economic business methods to farm practices; Field Crops, their classification, production and improvement; Soils, their fertility, cultivation and improvement. The Department of Agronomy includes the Divisions of Farm Crops and Soils.

The admirable quarters in the Hall of Agriculture enable the Agronomy Department to offer work in accord with the demands of the times. Commodious and well lighted class-rooms, with new and well equipped research laboratories, offer the best of facilities for lecture and laboratory work.

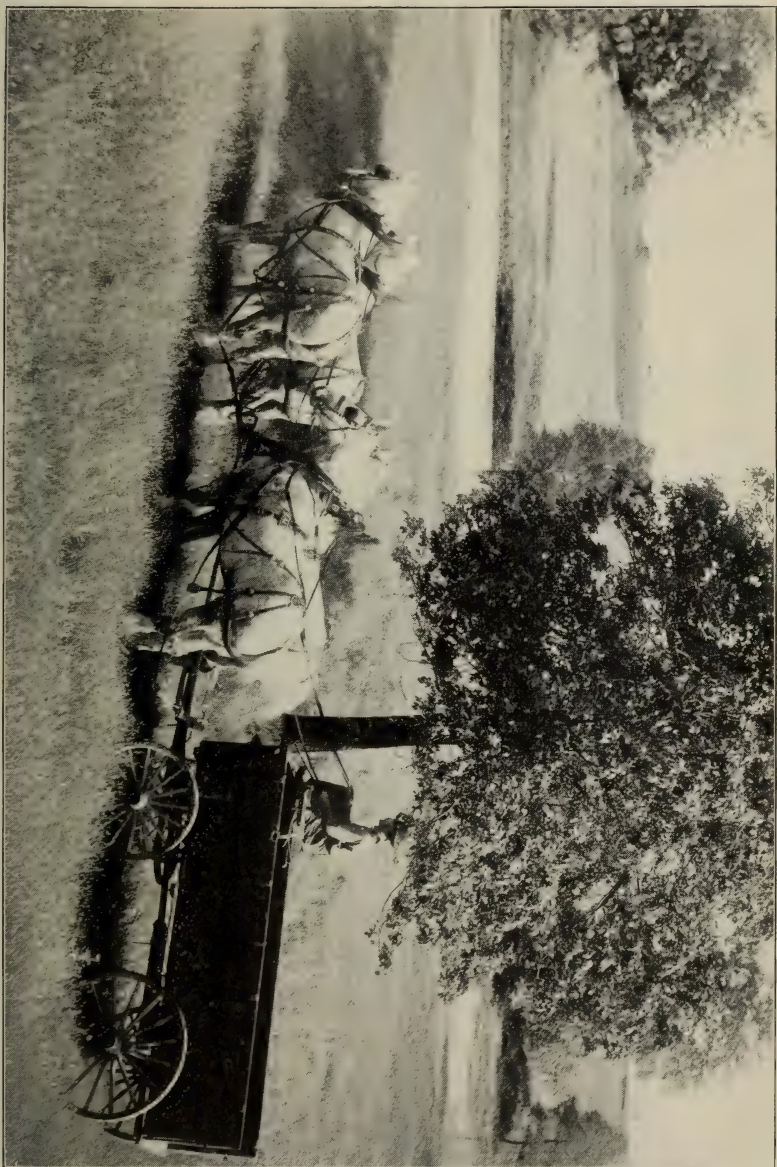
The general work in the study of cereals is conducted in the grain laboratory on the second floor of the stock and grain judging pavilion. The more advanced and more scientific study of crops is pursued in the corn and small grain laboratories on the fourth floor of the Hall of Agriculture. Research laboratories, equipped with chemical and general apparatus used in Farm Crops research, offer special opportunities for investigation to graduate students.

The increased demand for competent farm managers has far outrun the supply. The demand is increasing for trained men in farm crops, to fill positions as teachers of agriculture in secondary schools, assistants in seed houses, and assistants on the editorial staffs of agricultural journals. The number of men well trained in farm crops, who are putting in operation on the farm the principles and practices studied in college, is annually increasing. Many men who have taken special training in farm crops production and breeding, have returned to their farms, where they are making a profitable specialty of raising pure-bred corn or small grain.

A knowledge of the fundamental principles which underlie all successful systems of soil management should be the possession of every farmer. Without this knowledge he cannot produce maximum crops nor successfully maintain the fertility of his soil. No greater obligation rests upon the American farmer than the conservation of our greatest natural resource, namely, the land. It is the aim of the Soils Department to teach in a logical way the important principles concerning physical, plant food, and bacteriological soil factors. In order that this work may be carried on successfully, carefully outlined courses are offered to undergraduate and graduate students, including courses in Soil Physics, Soil Fertility and Soil Bacteriology.

On the first floor of Agricultural Hall, five commodious and well appointed soils laboratories have been thoroughly equipped for accurate and scientific work. Apparatus of the latest design has been installed in these laboratories, thus affording excellent facilities for regular, advanced, and graduate students in Soils. In addition to these excellent laboratory facilities, suitable greenhouses and field pots are available for certain lines of study and experimentation. The Department is also equipped with photographs, charts, and maps which are used in the lecture room and laboratory. Valuable and abundant data, which have been secured by the Soils Section from extensive soil experiments, prove very helpful to students who are especially interested in the problems relating directly to the soils of Iowa.

The work of the department is twofold; first, to fit young men to successfully solve the soil problems which are an integral part of every farmer's experience; secondly, to fit some students to creditably fill posi-



A FARM DRAFT TEAM

tions in Agricultural colleges and Experiment stations and in other institutions in which the subject of Soils is taught. There is a constantly increasing demand for men well trained in Soils, and each year the department is asked to recommend men for desirable positions.

COURSE IN AGRONOMY

For Freshman year, see Agricultural Course, page 79.

Sophomore Year

THIRD SEMESTER

		Required Semester Hours
Farm Crops 3,	Corn and Small Grain Judging	2
Agricultural Chemistry 25,	Organic Chemistry	3 $\frac{2}{3}$
Agricultural Engineering 4,	Farm Engineering	3 $\frac{1}{3}$
Botany 68,	Vegetable Physiology	3 $\frac{1}{3}$
Animal Husbandry 3,	Breed Types of Cattle and Sheep	3 $\frac{1}{3}$
English 11,	Exposition	3
Military 3, or Athletics		R
		—
	Total semester hours	18 $\frac{2}{3}$

FOURTH SEMESTER

		Required Semester Hours
Farm Crops 17,	Grasses, Forage and Fibre Crops	2
Agricultural Chemistry 26,	Agricultural Analysis	3 $\frac{1}{3}$
Agricultural Engineering 5,	Farm Machinery and Farm Motors	2 $\frac{2}{3}$
Animal Husbandry 4,	Breed Types of Dairy Cattle,	
	Horses and Swine	3 $\frac{1}{3}$
English 10,	Narration and Description	3
Zoology 16,	General Zoology	4 $\frac{1}{3}$
Military 4, or Athletics		R
		—
	Total semester hours	18 $\frac{2}{3}$

Junior Year

FIFTH SEMESTER

		Required Semester Hours
Soils 1,	Soil Physics	4
Choice {	*Farm Crops 19,	
	*Soils 17,	
Botany 24,	Seminar	
Economic Science 9,	Seminar	
Horticulture 33,	Embryogeny	1 $\frac{2}{3}$
	Outlines of Economics	3
	Truck Farming	2

* These courses must be continued through the year. Final standing will not be certified to recorder until close of sixth semester.

Horticulture 4,	Plant Breeding	2 $\frac{2}{3}$
Zoology 4,	Entomology	3 $\frac{1}{3}$
		<hr/> 16 $\frac{2}{3}$

Electives will be selected from the list on page 144, 0 to 3 $\frac{1}{3}$

Total semester hours 16 $\frac{2}{3}$ to 20

* These courses must be continued through the year. Final standing will not be certified to recorder until the close of the eighth semester.

SIXTH SEMESTER

Required
Semester Hours

Soils 2,	Soil Fertility	4
Choice { Farm Crops 9,	Research Work 2}	
Soils 3,	Research Work 2}	2
Farm Crops 4,	Corn and Small Grain Breeding	1 $\frac{2}{3}$
Bacteriology 1,	General Bacteriology	4
English 12,	Argumentation	2
Choice { *Farm Crops 19,	Seminar 1}	
*Soils 17,	Seminar 1}	1
		<hr/> 14 $\frac{2}{3}$

Electives will be selected from the list on page 144, 1 $\frac{1}{3}$ to 5 $\frac{1}{3}$

Total semester hours 16 to 20

* A continuation of work in fifth semester. Standing will be for fifth and sixth semesters. One hour credit for both semesters' work will be recorded at end of the sixth semester.

Senior Year

SEVENTH SEMESTER

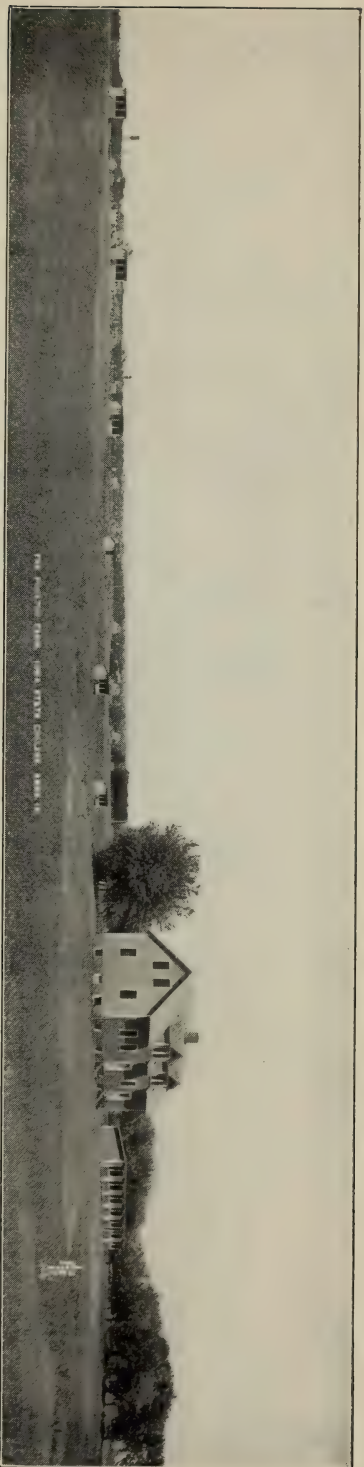
Required
Semester Hours

Farm Crops 8,	Farm Management	3
Soils 6,	Advanced Soil Fertility	2
Soils 8,	Soil Bacteriology	4
Choice { Soils 4,	Research Work 2}	
{ Farm Crops 9 or 10,	Research Work 2}	2
Agricultural Journalism 1,	Beginning Journalism	1
Animal Husbandry 20,	Animal Feeding	2
Animal Husbandry 21,	Principles of Breeding	2
Horticulture 8,	Landscape Gardening	2
Choice { *Farm Crops 20,	Seminar }	
*Soils 18,	Seminar }	
		<hr/> 18

Electives will be selected from the list on page 144, 0 to 2

Total semester hours 18 to 20

* These courses must be continued through the year. Final standing will not be certified to recorder until the close of the eighth semester.



THE FARMER'S HOME - 1884 (1874) - 1884



THE POULTRY PLANT—THE DAIRY FARM

EIGHTH SEMESTER

		Required Semester Hours	
Choice	Farm Crops 15,	Thesis	3
	Farm Crops 16,	Thesis	5
	Soils 11,	Thesis	3
	Soils 12,	Thesis	5
	*Farm Crops 20,	Seminar	1
Choice	*Soils 18,	Seminar	1
	Agricultural Journalism 2,	Advanced Journalism	1
or 4,		Newspaper Management	1
	Botany 66,	Vegetable Pathology	2 $\frac{2}{3}$
	History 19,	History of Political Parties	2

Electives will be selected from the list on page 144

Total semester hours

9 $\frac{2}{3}$ 11 $\frac{2}{3}$
6 $\frac{1}{3}$ 10 $\frac{1}{3}$

16 20

COURSES IN FARM CROPS

1. **Corn Growing and Judging.** The corn plant, methods of selecting, storing, testing, grading, planting, cultivating and harvesting. Cost of production, use of the crop, and commercial marketing are studied. Corn in the field with reference to per cent stand, barren stalks and suckers; leaf surface and correlation of the parts of the stalk. Each student is required to make his own plot, husk it, select the seed ears and hang them up for storage and shrinkage test. A detailed study is made of the structure of the cornstalk, ear, and kernel. The corn scoring and judging are taken up during the last part of the semester. Two and two-thirds hours' credit. Recitations, two hours, and laboratory, two hours per week. Fee, \$1.50.

2. **Small Grain.** Oats, wheat (winter and spring), barley, rye, emmer and speltz and macaroni wheat; their adaptation to soils and climate, preparation of seed bed, methods of seeding, botanical structure, problems of germination and plant growth; also score card practice and the principles of commercial grading in small grains. Two and two-thirds hours' credit. Recitations, two hours, and laboratory, two hours per week. Fee, \$1.50.

3. **Corn and Small Grain Judging.** Under conditions identical to those found in show rooms, the student receives a training which makes him an excellent judge of quality in these grain seeds. He studies variety and breed characteristics, giving special attention to the strong and weak points of each. Prerequisites, Farm Crops 1 and 2. Two lecture and laboratory periods per week. Two hours' credit. Fee, \$2.00.

* A continuation of the work in the seventh semester. Standing will be for seventh and eighth semesters. One hour credit for both semesters' work will be recorded at end of eighth semester.

4. **Corn and Small Grain Breeding.** Origin of corn and small grains. Characteristics of the leading varieties of corn, and the adaptation of these varieties to the varying soil and climatic conditions of the state. Principles of improvement and breeding are investigated. Methods employed in the breeding of corn and small grains by prominent commercial corn breeders are made a special feature in this course. Prerequisites, Farm Crops 1 and 2, Horticulture 4, Botany 24. One lecture and one laboratory period per week. One and two-thirds hours' credit. Fee, \$2.00.

8. **Farm Management.** Typical illustrations of the differing phases of specialized farming and of general farming; problems of labor, fencing and marketing and methods employed by successful farmers are presented. A practical and thorough study of a system of farm accounts. Actual field study of the laying out and conducting of farms is made, and special exercises in planning of rotations, field locations and placing of buildings. Three hours' credit. Two lectures and one lecture and laboratory per week. Fee, \$2.00.

9. **Research in Farm Crops.** Individual investigation of special problems relating to Farm Crops Subjects. Experiments are conducted in both field and greenhouse. Prerequisites, Farm Crops 1 and 2. Two hours' credit. Laboratory, six hours per week. Fee, \$2.00.

10. **Advanced Research in Farm Crops.** Advanced research into the problems of crop production and breeding of farm crops. Prerequisite, Farm Crops 9. Laboratory, six hours per week. Two hours' credit. Fee, \$3.00.

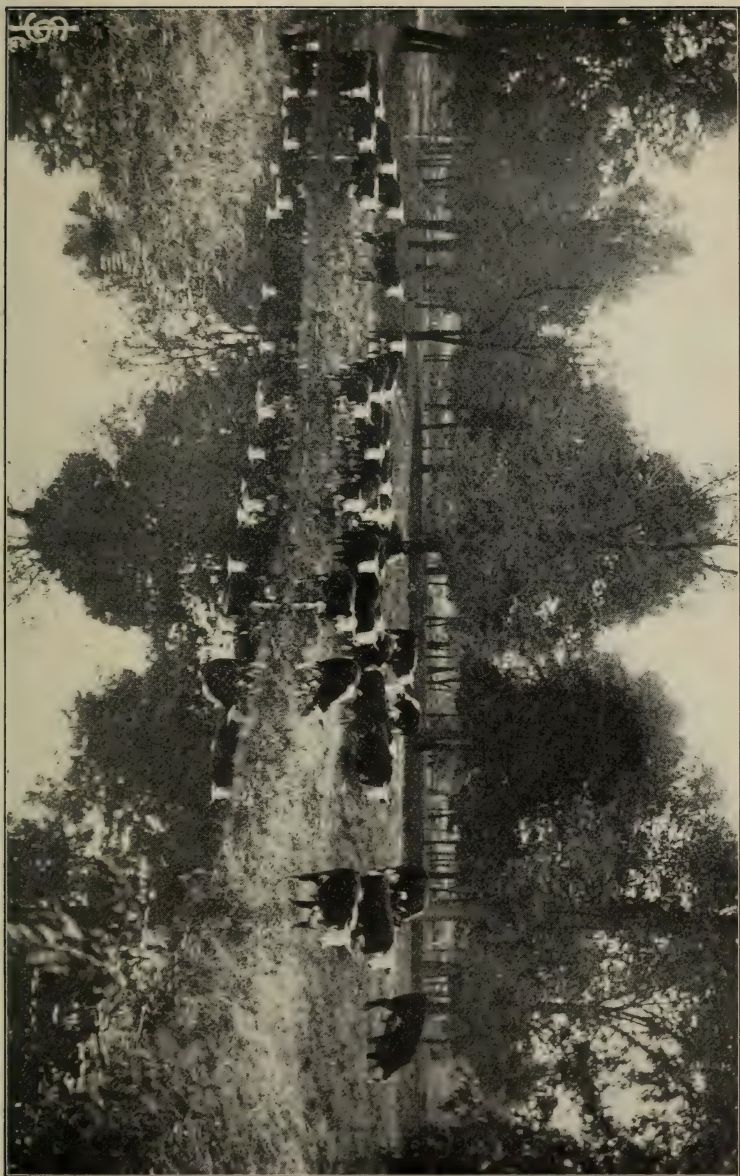
11. **Advanced Study of Corn.** A deeper study of the principles underlying the breeding of corn. The latest scientific knowledge of corn breeding. Thorough study of the leading varieties of corn growing in the state. Prerequisite, Farm Crops 3. Lecture, one hour per week. One hour's credit.

12. **Advanced Study of Small Grains.** A special study of the principles of plant breeding, as they are revealed by the breeding of small grains. The evolution of plant breeding. Special attention to experiment station methods and accomplishments in this line of work. The object of the course is to put the student in possession of the scientific facts and principles underlying this work, as well as to give him working knowledge of scientific methods for the pursuit of such investigation. Grain judging, expert judging at fairs and expositions, and practical knowledge of grain. Prerequisite, Farm Crops 4. One lecture and one laboratory period per week. One and two-thirds hours' credit. Fee, \$3.00.

15. **Thesis.** This investigation must be pursued upon some subject requiring original work. Three hours' credit.

16. **Thesis.** Same as above, except that it is five hours' credit.

17. **Grasses, Forage and Fiber Crops.** Grasses grown in the corn belt, investigation into their composition, habits of growth, adaptability to various types of soils and climatic conditions and the methods of seeding and handling. Such forage and fiber crops as have been grown



PASTURE SCENE ON THE COLLEGE FARM

in Iowa, and others that could be profitably introduced, will be given study similar to the above. Special attention will be given to the growth and breeding of alfalfa, clover and timothy. Two hours' credit. Lecture and laboratory, two hours per week. Fee, \$2.00.

18. **Summer Course in Farm Crops.** Small grains, grasses and clovers; habits of early growth, structure, rate of growth, reproduction, variations, correlations, effects of different methods of planting. Also Experiment Station Methods. Five hours' credit. Laboratory, three consecutive weeks, beginning immediately after commencement. Fee, \$5.00.

19. **Farm Crops Seminar.** The Juniors and Seniors in Farm Crops and Soils hold a joint seminar every two weeks while college is in session. At each meeting papers prepared by students are presented and topics of special interest to Agronomy students are discussed. One hour's credit.

20. **Farm Crops Seminar.** Continuation of Course 19. One hour's credit.

21. **Special Advanced Judging.** Use will be made of the various score cards until the student's judgment is well developed and comparative values of various characteristics are well established. The greater part of the time will be devoted to the judging of corn, but sufficient time will be given to the small grains, oats, wheat and barley. Open to all students who have had Farm Crops 1 and 2. Laboratory four hours per week. One and one-third hours' credit. Fee, \$3.00.

COURSES IN SOILS

1. **Soil Physics.** Origin, formation and classification of soils; soil moisture and methods of conserving it; the principles which underlie dry farming; soil temperature, and conditions influencing it; soil texture as affecting heat, moisture and plant food; surface tension, capillarity, osmosis, and diffusion as affecting soil conditions; the effect upon the soil and the crop of plowing, harrowing, cultivating, cropping, and rolling; washing of soils and methods of preventing the same; preparation of seed beds; cultivation and drainage as affecting moisture, temperature, root development and the supply of available plant food. The work also comprises the determination of the specific gravity, apparent specific gravity, volume weight, porosity, water-holding capacity, and capillary power of various soils; also effect of mulches on the evaporation of water from the soil and the physical effects upon the soil of different systems of rotation and of continuous cropping. Prerequisite, Physics 205. Four hours' credit. Two lectures and two lecture and laboratory periods per week. Deposit, \$4.00.

2. **Soil Fertility.** Maintenance of fertility, fertilizers and rotations; the influence of commercial fertilizers, barn-yard manure, and green manure upon the quality and yield of various crops; the effect of different crops upon the fertility of the soil and upon succeeding crops; different systems of rotation and the effect upon the productiveness of the soil of

various methods of soil management; also storing, preserving, and application of farm-yard manure. This work is supplemented by a laboratory study of manures, fertilizers and soils; their composition and agricultural value. Pot and field experiments are conducted to show the influence of fertilizers, applied to the soil in different quantities and at different times, upon the quality and yield of various crops. Special attention is given to leguminous as fertilizers and their place in crop rotation. Special types of soil which are found in different sections of the state, such as clay, gumbo, loess, and peat, with special reference to the best methods of handling and cropping these soils. Prerequisites, Soils 1, and Chemistry 26, but for the Dairy Course, Soils 1 and for the Horticulture Course, Chemistry 26 are not required. Four hours' credit. Two lectures and two lecture and laboratory periods per week. Deposit, \$8.00.

3. **Research Work in Soil Physics.** Experimentation and study of special problems relating to the physical characteristics of soils and their relation to crop production. Experiments may be carried on in the laboratory, greenhouse, or field. Modern laboratory and greenhouse facilities offer to the student an excellent opportunity for research work from the standpoint of Soil Physics. A wide range of special subjects is afforded the student. This course offers special advantages for a study of the physical composition of soils. Prerequisite, Soils 1. Two hours' credit. Laboratory, six hours per week. Deposit, \$5.00.

4. **Research Work in Soil Fertility.** Experimentation and study of special problems relating to maintaining and increasing the productive capacity of soils. Types of soil, certain systems of soil management, plant food, and productive capacity of soils. Pot culture investigations and the chemical composition of soils. Prerequisites, Soils 1 and 2. Two hours' credit. Laboratory, six hours per week. Deposit, \$5.00.

6. **Advanced Soil Fertility.** Plant food content and productiveness of particular types or classes of soils; the utilization of soils; and the principles which underlie the management of soils under arid, semi-arid, and sub-humid conditions. Special attention is given to the principles of soil conservation. This course also affords the student an opportunity to study the methods of experimentation which are employed by leading investigators and farmers along soil fertility lines. Prerequisites, Soils 1 and 2. Two hour's credit. Two lectures per week. Fee, \$1.00.

7. **Investigation of Special Soils.** Work of the Rothamsted Experiment Station and at the leading Experiment Stations of this country, with special reference to the effect of different systems of soil management upon the productive capacity of the soil. This course affords the student an opportunity to study and discuss the great mass of data which has been collected during a period of more than half a century at the most famous experiment stations in the world. Prerequisites, Soils 1 and 2. One hour's credit. Lectures, one hour per week.

8. **Soil Bacteriology.** Soil Bacteria and their activities in their

natural habitat and a preliminary consideration of the influence which they exert on soil fertility. The work involves purely quantitative bacteriological examinations of different soil types followed by both qualitative and quantitative determinations of the various processes induced by their bacterial floras including ammonification, nitrification, denitrification symbiotic and non-symbiotic nitrogen fixation, ammonia and nitrate-nitrogen transformation, cellulose fermentation, urea fermentation, etc. Organisms are isolated from each of the various groups and examined culturally, morphologically and physiologically. Especial attention is devoted to comparisons of the methods available for the bacteriological and chemical technique involved and to the interpretation of results. Prerequisites, Chemistry 26 and Bacteriology 1. Two lectures and three laboratory periods per week. Four hours' credit. Deposit, \$8.00.

11. **Thesis.** Must be upon some subject requiring original investigation in Soils. Three hours' credit.

12. **Thesis.** Same as Soils 11, except that it is five hours' credit.

13. **Soil Surveying and Mapping.** Physical properties of Soils and their physical composition as determined by mechanical analysis. The preparation of large scale plane table maps of selected areas and a detailed survey of the soils. Also the relation of topography and the physical and chemical composition of soils to the character and growth of the native vegetation. The principles underlying the adaptability of particular soils to different kinds of forest and fruit trees, and to various farm and garden crops. Prerequisite, Soils 1. One and two-thirds hours' credit. Lectures, one hour, and laboratory, two hours per week. Fee, \$2.00.

14. **Advanced Soil Bacteriology.** A continuation of the work given in Soils 8, involving a further consideration of the influence of bacterial activities on Soil Fertility. Special problems are studied by means of laboratory and greenhouse experiments dealing with the fixation of atmospheric nitrogen; the transformation of nitrogenous carbonaceous, and mineral compounds in the soil; the effect of manurial and fertilizer treatment on the various bacterial activities; the adequacy of the bacteriological methods now employed in indicating the crop-producing power of soils. Prerequisite, Soils 8. Lecture or reports on assigned reading, one hour, laboratory, six hours per week. Three hours' credit. Deposit, \$8.00.

15. **Advanced Laboratory Work in Soil Physics.** Physical composition of soils by mechanical analysis and petrological examination; the determination of the temperature, moisture, and soluble salt content of various soils under field conditions, including methods of testing for alkali soils. Greenhouse, laboratory and field experiments are conducted to determine the effect upon soil conditions of different methods of soil management; the work also includes assigned readings, study of results of previous investigations, and written reports of results of experiments and investigations. Prerequisite, Soils 1. Two hours' credit. Laboratory, six hours per week. Deposit, \$4.00.

16. **Advanced Laboratory Work in Soil Fertility.** Chemical composition of soils, analysis of typical soils of the state, or any particular locality, with special reference to the determination of humus, nitrogen, phosphorus, potassium and lime. Physiological soil analysis by the paraffin wire basket method and larger pot cultures, and by growing of plants in aqueous extracts of soils. The work also includes assigned readings, study of results of previous investigations, and written reports of results of experiments and investigations. Prerequisite, Soils 2. Two hours' credit. Laboratory, six hours per week. Deposit, \$5.00.

17. **Soils Seminar.** One hour's credit. The Juniors and Seniors in Soils and Farm Crops hold a joint seminar each two weeks while college is in session. At each meeting, papers prepared by students are presented and topics of special interest to Agronomy students are discussed.

18. **Soils Seminar.** A continuation of Course 17. One hour's credit.

Department of Dairying

MARTIN MORTENSEN, PROFESSOR

WALTER HENRY COOPER, ASSISTANT PROFESSOR

BERNARD WERNICK HAMMER, ASSISTANT PROFESSOR IN DAIRY BACTERIOLOGY

RAY GLENN JONES, INSTRUCTOR

CHARLES L. BEARDSHEAR, INSTRUCTOR

CLEM J. O'NEIL, STUDENT-ASSISTANT

THEODORE MACKLIN, EXTENSION WORK

Owing to the rapid progress and the application of scientific principles to the dairy industry, it is necessary that those engaged in this work should keep in touch with new ideas and principles. In order to meet this demand, the dairy department offers a four-year course for qualifying students to become competent teachers and investigators of dairying in agricultural colleges and experiment stations, inspectors of dairy products and creameries in municipal, state and government service, or superintendents of large creameries or dairy farms.

The Dairy Department offers unexcelled facilities for teaching dairying in a thoroughly practical and scientific manner. The dairy farm of 200 acres is well stocked with various types and breeds of milk cows. The milk from this herd, together with the milk and cream shipped and hauled to the college, supplies all the needs of the creamery.

The Dairy Building erected at a cost of about \$75,000 is a practical working creamery, and cheese and ice-cream factory, and is considered by authorities to be one of the most practical and complete dairy buildings in existence.

COURSE IN DAIRYING

For Freshman year, see Agricultural Course.

Sophomore Year**THIRD SEMESTER**

		Required Semester Hours
Dairying 11,	Cheese Making	3
Animal Husbandry 3,	Breed Types of Cattle and Sheep	3½
Agricultural Chemistry 25,	Organic Chemistry	3½
Economic Science 9,	Outlines of Economics	3
English 11,	Exposition	3
History 19,	History of Political Parties	2
Public Speaking 10,	Extempore Speech	2
Military 3, or Athletics		R
		—
	Total semester hours	20

FOURTH SEMESTER

Dairying 13,	Milk Testing and Milk Inspection	1½
Dairying 24,	Fancy Cheese Making	2½
Animal Husbandry 4,	Breed Types of Dairy Cattle,	
	Horses and Swine	3½
Agricultural Chemistry 26,	Agricultural Analysis	3½
Choice {	Economic Science 10,	3 } 3
	History 6,	
	Europe in the XIX Century	
English 10,	Narration and Description	3
Public Speaking 11,	Extempore Speech	2
Military 4, or Athletics		R
		—
	Total semester hours	18½

Junior Year**FIFTH SEMESTER**

		Required Semester Hours
Dairying 14,	Advanced Butter Making	5
Dairying 16,	Technology of Milk	1
Dairying 26,	Judging Dairy Products	1
Agricultural Chemistry 40,	Dairy Chemistry	3½
Animal Husbandry 21,	Principles of Breeding	2
Botany 72,	Microscopical Examination of	
	Foods	1½
Horticulture 8,	Landscape Gardening	2
		—
		16

Electives will be selected from the list on page 144	0	to	4
Total semester hours	16	to	20

SIXTH SEMESTER

Required
Semester Hours

Dairying 27,	Butter Judging	1
Agricultural Engineering 23,	Dairy Engineering	3½
Agricultural Chemistry 65,	Advanced Dairy Chemistry	3½
Bacteriology 1,	General Bacteriology	4
English 12,	Argumentation	2
Soils 2,	Soil Fertility	4
		17½

Electives will be selected from the list on page 144	0	to	2½
Total semester hours	17½	to	20

Senior Year

SEVENTH SEMESTER

Required
Semester Hours

Dairying 17,	Dairy Bacteriology	4
Dairying 19,	Seminar Work	1
Dairying 28,	Advanced Butter Judging	1
Agricultural Journalism 1,	Beginning Journalism	1
Animal Husbandry 20,	Animal Feeding	2
Veterinary 19,	Obstetrics	1
Veterinary 44,	Sanitary Science	2
		12

Electives will be selected from list on page 144,	4	to	8
Total semester hours	16	to	20

EIGHTH SEMESTER

Required
Semester Hours

Dairying 20,	Factory Management	3½
Dairying 21,	Preparation of Ice Cream and Ices	1½
Dairying 23,	Thesis	2
Animal Husbandry 15,	Milk Production	1
Agricultural Journalism 2,	Advanced Journalism or	
or 4,	Newspaper Management	1
Farm Crops 17,	Grasses, Forage and Fibre Crops	2
*Literature 3,	Novel and Romance	3
		14

Electives will be selected from list on page 144,	2	to	6
Total semester hours	16	to	20

* Or any other three hour literature in list.

COURSES IN DAIRYING

10. **Domestic Dairying.** Nutritive and economic value of milk; its dietetics and hygiene; market milk, infants' milk, invalids' milk, cream, ice cream, condensed milk, milk chocolates, malted milk, dried milk, fermented milks (Kephir, Koumissete), buttermilk, butter, and cheese. Demonstrations are given in types of butter and cheese and in testing the purity of milk and butter. Two lectures per week. Fee, \$2.50.

11. **Cheesemaking.** Quality and composition of milk in the manufacture of Cheddar cheese; the principles involved in cutting, heating, milling, salting and pressing the curd, curing and marketing; influence of organized and unorganized ferments in cheese; and the construction and ventilation of cheese curing rooms. Three hours' credit. Recitation, one hour, and laboratory, six hours per week. Fee, \$3.50.

12. **Farm Dairying.** Secretion, composition, testing, separation and acidity of milk, preparation of starters, ripening of cream, and churning and packing butter. Two and two-thirds hours' credit. Recitation, two hours, and laboratory, two hours per week. Fee, \$3.00.

13. **Milk Testing and Milk Inspection.** Babcock test, Farrington's and Manns' test for determining acidity, sampling, and testing of individual cows, and detection of different preservatives and adulterations. One and two-thirds hours' credit. Recitation, one hour, and laboratory, two hours per week. Fee, \$2.50.

14. **Advanced Buttermaking.** Physical and chemical properties, secretion and composition; separation of milk, cream ripening, the principles of churning, packing and marketing butter. Prerequisite, Agricultural Chemistry 21. Five hours' credit. Recitations, three hours, and laboratory, six hours, per week. Fee, \$3.00.

16. **Technology of Milk.** Utilization of milk and its products, as the preparation of condensed, modified, and milk sugar, casein, and the food value of milk and its products. Prerequisite, Agricultural Chemistry 25. Recitation, one hour per week. Fee, 50 cents.

17. **Dairy Bacteriology.** Bacteria in milk and its products; their sources, mode of entry and subsequent changes produced; the production and handling of milk from a hygienic and economic viewpoint and its relation to the public health. Prerequisites, Bacteriology 1 or 15, and Chemistry 26. Four hours' credit. Lectures, two hours, and laboratory, six hours per week. Fee, \$4.00.

19. **Seminar Work.** Authorities on Dairying together with the work of the experiment stations. Prerequisites, Bacteriology 1, Dairying 11 and 14. A knowledge of French and German is recommended. One hour per week.

20. **Factory Management.** Location, organization, construction, drainage, and ventilation of factories, the treatment of the by-products, and creamery refrigeration, thus qualifying a student to superintend or manage a large factory or dairy establishment. It is advisable for stu-

dents to put in the laboratory during vacation or when work can be done during consecutive days. Prerequisites, Dairying 14 and 28. Three and one-third hours' credit. Lecture, two hours, and laboratory, four hours, per week.

21. **Preparation of Ice-cream and Ices.** On a private or commercial scale. One and two-thirds hours' credit. One recitation and one two hour laboratory. Fee, \$3.00.

23. **Thesis.** Original work on some dairy subject. May be worked in co-operation with the departments of chemistry or bacteriology. Students should consult the professor concerning their subject at the beginning of their Senior year. Two hours per week.

24. **Fancy Cheesemaking.** Includes making the varieties found in the American market as Limburger, Swiss, Brick, Roquefort, Sage, Stilton, Pineapple, Gouda Gorgonzola and Neufchâtel. Two and one-third hours' credit. Lecture, one hour, and laboratory, four hours, per week. Fee, \$3.00.

25. **Advanced Dairy Bacteriology.** Laboratory investigation of bacteriological problems relating to dairying, the nature of the work being largely adapted to the individual student. Prerequisite, Dairying 17. Credit, three hours.

26. **Judging Dairy Products.** Judging of butter, milk and cream, ice-cream, sherbet, and the various kinds of cheeses, paying special attention to score cards. Prerequisite, Dairying 13. One hour's credit. Fee, \$3.00.

27. **Butter Judging.** Standard market requirements. Advanced work in scoring butter. Prerequisites, Dairying 14 and 26. One hour's credit. Fee, \$3.00.

28. **Advanced Butter Judging.** Intended to qualify a student to fill the position of an official judge. One hour's credit. Fee, \$3.00.

Department of Animal Husbandry

WILLARD JOHN KENNEDY, PROFESSOR

EDWARD NORRIS WENTWORTH, ASSOCIATE PROFESSOR

WILLIAM HARPER PEW, ASSOCIATE PROFESSOR

CLARE NEWTON ARNETT, ASSOCIATE PROFESSOR

HENRY HERBERT KILDEE, ASSISTANT PROFESSOR, SUPT. OF DAIRY FARM

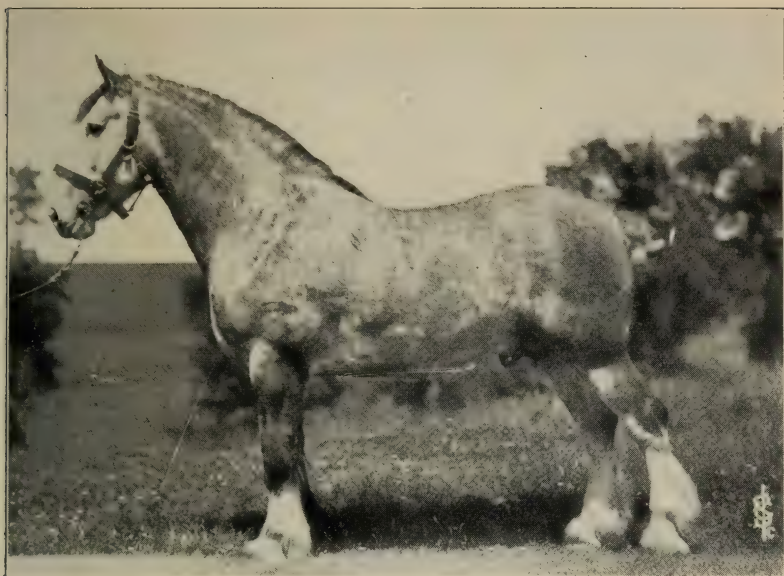
WILLIAM A. LIPPINCOTT, ASSISTANT PROFESSOR IN CHARGE OF POULTRY

FRANK N. MARCELLUS, INSTRUCTOR IN POULTRY

RALPH K. BLISS, EXTENSION WORK

ARTHUR A. BURGER, EXTENSION WORK

The department of Animal Husbandry stands for all lines of work which pertain to the judging, selecting, breeding, feeding, development,



INTERNATIONAL WINNERS USED IN GOVERNMENT HORSE BREEDING WORK AT AMES

care, and management of the various breeds and classes of domesticated animals. Because of the importance of the live stock industry to the welfare of the state, and because of the demand for instruction in this line, the equipment for instruction has been made as complete in every detail as possible.

The herds and flocks, established at an early date, have been added to from time to time until our equipment in this line, consisting of almost all recognized breeds of animals, places us in a position to do work in Animal Husbandry lines which cannot be accomplished in those institutions where such specimens are not furnished for instruction. Believing that training the eye is the only way to make a young man a proficient judge of live stock, the work of the lecture room and laboratory is demonstrated by the use of living specimens.

The three commodious judging pavilions, located near the barn, afford ample room for dividing the classes into many sections, thus allowing individual work.

An excellent collection of horses representing all the market classes and the breeds of both light and heavy types is maintained for instruction purposes. Among these are good representatives of the Shires, Percherons, Clydesdales, French Coachers, Hackneys, Standard breeds, and American Saddle Horses. Some of the horses are imported; while the others have been purchased, with much care in their selection, from the best breeders on the continent.

More than 200 head of cattle, representing all the leading beef, dual-purpose, and dairy breeds are maintained on the farm. Complete breeding herds of most of the breeds are kept. An excellent collection of steers, representing the highest type of fat steer, and all the other classes and grades to be found in our leading markets down to the very lowest grades, is always available for class work. This affords our students an excellent opportunity to study the market demands and to know what constitutes each class, also why there is such a wide margin in the prices paid for cattle by the packer.

The dairy farm is well stocked with dairy cattle, including a herd of about a hundred representatives of the Holsteins, Jerseys, Guernseys, Ayrshires, milking Short-horns, with good sires of the different breeds. This equipment affords an excellent opportunity for class work when studying the origin, history, and development of the different breeds of dairy cattle, their characteristics and the conditions under which they are evolved; also for carrying on investigations along the lines of breeding, feeding and management of the dairy herd for profit; and the relative values of home-grown feedstuffs and by-products in the production of milk and butter fat.

The flock of sheep, consisting of over 200 head of seven different breeds, have been carefully selected to represent the type and characteristic of each breed, both in regard to form and wool-bearing qualities. In addition to the breeding flocks, the department has a choice collection of fat wethers which affords an opportunity for the student to familiarize

himself with the highest type of finished mutton sheep. All these are available for class work.

In the swine department, representatives of six breeds of the best American and British varieties are maintained. As in the other departments, the aim in this has been to keep in touch with the modern ideas of leading breeders, both in regard to breeding and the type of the animals in these breeds.

At all seasons of the year there is more or less feeding of market stock being done on the farm and in connection with the Experiment Station, so that excellent material is always available for instruction purposes regarding the qualities that add to the value of stock for the ordinary market. Having pure-bred representatives, it is easy to inform the student in a practical way on the finer points of color, type, and other characteristics that relate to the pure-bred classes of stock.

To assist further in this work, the herd books of the different American and foreign registry associations are being constantly added to the library. The College possesses the most complete set of the English Short-horn herd books in existence in America. Through herd book study, the student is enabled not only to inform himself in regard to pedigrees, but he is enabled also to study the different scales of points which the breeders have adopted to represent the highest types of the various breeds.

The department is also equipped with photographs, charts, and lantern slides which are used in the lecture room when it is impossible to illustrate with the living animal. The abundant material available from the herds and flocks is used extensively in all lectures and score card practice. By means of score cards prepared by the department, the students are brought in close contact with the animals, and through them are informed on the points of market merit desirable in ordinary stock, while later the use of the official scale or points for the different breeds in a similar way makes them skillful in judging representatives of different breeds.

As soon as the student is familiar with the use of the score card, comparative judging is introduced. In comparative judging from four to six animals are used, and each student is required to place all the animals in order of merit, and write down clearly and concisely on a blank folder, prepared especially for this work, full reasons for making his awards. This kind of work teaches the student to compare animals and to balance the weak and the strong points of each in making his final awards. As soon as the student demonstrates his ability to place classes well, herd groups and sweepstake classes are introduced during his Senior year's work. This kind of work is similar to the most difficult judging done at our leading state fairs and international expositions. As soon as the student shows that he possesses the qualifications needed to judge stock in the show ring, he is sent out, in answer to the many requests from the secretaries, to judge various classes of stock at county

fairs. This, in connection with his college work, results in establishing the lessons learned in the class room.

Positions Open for Men Trained Along Animal Husbandry Lines

There is a great demand for competent young men trained along the lines of practical and scientific Animal Husbandry work, men who combine their college training with practical experience and native ability. Such is the training offered to the young men in this course. The demand for such students is unlimited at a compensation not exceeded in any other calling. A few of the many lines of work open to graduates of this department are: College and experiment station work, agricultural journalism, managers of stock farms, salesmen with commission merchants, buyers for the packing houses at the many stockyard centers, and salesmen of animal feedstuffs manufactured by the packing houses, glucose companies, linseed and cottonseed oil companies.

POULTRY HUSBANDRY

The Poultry Husbandry Department affords opportunities for instruction in all lines of poultry work, such as the selection, care and management, incubating, brooding, judging, breeding, feeding, showing, marketing and diseases of various varieties of fowls, ducks, turkeys and geese.

The Poultry Farm of nearly twenty acres, upon which the buildings have been erected during the last two years, offers unexcelled opportunities for practical instruction. The buildings consist of a large headquarters building, long poultry house, and many colony houses for brooders, young stock, breeding stock, and fattening stock. The Headquarters Building contains a large feed room, carpenter shop, incubator room, killing and marketing room, egg room, and room for attendants; and is, without doubt, the best building of its kind in the country. The long poultry house, used in laboratory and investigation work, is of the cloth curtain type, and consists of seven 12x12 pens which, together with the colony houses, have a capacity of approximately 1,000 head of poultry. All pens are equipped with trap nests so that individual egg records may be obtained from each hen. The Incubator Room is equipped with machines made by several of the leading incubator firms and affords opportunity for a complete study of the different types of incubators. A thorough study of the latest brooding methods is also made.

Positions Open to Men Trained Along Poultry Husbandry Lines

At the present time there is an urgent and increasing demand for college men who possess scientific training in Poultry Husbandry, together with practical experience and ability. Some of the openings for students trained along these lines are government, college and experiment station work, managers of utility and fancy poultry farms, poultry journalism and poultry judging, managers of poultry supply houses and poultry fattening establishments, and salesmen with the incubator and brooder manufacturers.

COURSE IN ANIMAL HUSBANDRY

For Freshman year see Agricultural Course, page 79.

Sophomore Year

THIRD SEMESTER

		Required Semester Hours
Animal Husbandry 3,	Breed Types of Cattle and Sheep	3½
Animal Husbandry 31,	Poultry Management	2
Agricultural Chemistry 25,	Organic Chemistry	3½
Agricultural Engineering 4,	Farm Engineering	3½
English 11,	Exposition	3
Zoology 20,	General Zoology	4½
Military 3, or Athletics		R
Total semester hours		19½

FOURTH SEMESTER

		Required Semester Hours
Animal Husbandry 4,	Breed Types of Dairy Cattle,	
	Horses and Swine	3½
Animal Husbandry 37,	Poultry Management	2
*Agricultural Chemistry 26,	Agricultural Analysis	3½
Agricultural Engineering 5,	Farm Machinery and Farm Motors	2½
*English 10	Narration and Description	3
Zoology 21,	General Zoology	4½
Military 4, or Athletics		R
Total semester hours		18½

Junior Year

FIFTH SEMESTER

		Required Semester Hours
Animal Husbandry 11,	Feeding and Management of	
	Live Stock	2
*Animal Husbandry 22,	Seminar	
Bacteriology 15,	General Bacteriology	2½
*History 19,	History of Political Parties	2
Soils 1,	Soil Physics	4
Veterinary 23,	Comparative Physiology	2
Zoology 19,	Embryology	2½
		15½
Electives will be selected from the list on page 144		⅔ to 4⅔
Total semester hours		16 to 20

* This course must be continued through the year. Final standing will not be certified to recorder until the close of the sixth semester.

SIXTH SEMESTER

		Required Semester Hours
Animal Husbandry 8,	Animal Breeding	2
Animal Husbandry 12,	Feeding and Management of Live Stock	2
*Animal Husbandry 22,	Seminar	1
Botany 26,	Ecology	1 $\frac{2}{3}$
English 12,	Argumentation	2
Soils 2,	Soil Fertility	4
Zoology 8,	Animal Parasites	2

 14 $\frac{2}{3}$

Electives will be selected from the list on page 144, 1 $\frac{1}{3}$ to 5 $\frac{1}{3}$

Total semester hours 16 to 20

* A continuation of work in fifth semester. Standing will be for fifth and sixth semesters. One hour credit for both semesters' work will be recorded at end of sixth semester.

Senior Year

SEVENTH SEMESTER

		Required Semester Hours
Animal Husbandry 6,	Advanced Live Stock Judging	1 $\frac{1}{3}$
Animal Husbandry 9,	Animal Nutrition and Packing House By-Products	2
*Animal Husbandry 23,	Seminar	
Horticulture 8,	Landscape Gardening	2
Soils 6,	Advanced Fertility	2
Veterinary 19,	Obstetrics	1
Veterinary 44,	Sanitary Science	2
Veterinary 55,	Anatomy of Domestic Animals	1 $\frac{1}{3}$

 11 $\frac{2}{3}$

Electives will be selected from the list on page 144, 4 $\frac{1}{3}$ to 8 $\frac{1}{3}$

Total semester hours 16 to 20

* This course must be continued through the year. Final standing will not be certified to the recorder until the close of the eighth semester.

EIGHTH SEMESTER

		Required Semester Hours
Animal Husbandry 7,	Herd Book Study	2
Animal Husbandry 10,	Thesis	2
Animal Husbandry 13,	Advanced Work in Beef Pro- duction	1
Animal Husbandry 14,	Advanced Work in Pork Pro- duction	1

Animal Husbandry 15,	Milk Production	1
Animal Husbandry 16,	Advanced Work in Mutton and Wool Production	1
Animal Husbandry 17,	Advanced Work in Horse Feeding	1
*Animal Husbandry 23,	Seminar	1
Veterinary 17,	Soundness and Shoeing	2
Zoology 6,	Evolution of Animals	1

—
13

Electives will be selected from the list on page 144, 3 to 7

—
Total semester hours 16 to 20

* A continuation of work in the seventh semester. Standing will be for seventh and eighth semesters. One hour credit for both semesters' work will be recorded at close of eighth semester.

POULTRY HUSBANDRY GROUP

For Sophomore year, see Animal Husbandry Course.

Junior Year

FIFTH SEMESTER

		Required Semester Hours
Animal Husbandry 11,	Feeding and Management of Live Stock	2
Animal Husbandry 32,	Practice in Poultry Feeding	1
*Animal Husbandry 40,	Poultry Seminar	
Animal Husbandry 43,	Market Types of Poultry	2
Bacteriology 15,	General Bacteriology	2 $\frac{2}{3}$
Horticulture 8,	Landscape Gardening	2
Soils 1,	Soil Physics	4
Zoology 19,	Embryology	2 $\frac{2}{3}$
		— 16 $\frac{1}{3}$
Electives will be selected from list on page 144		0 to 3 $\frac{2}{3}$
	Total semester hours	— 16 $\frac{1}{3}$ to 20

* Course 40 continues throughout the year. Credit is given at the close of the sixth semester.

SIXTH SEMESTER

		Required Semester Hours
Animal Husbandry 8,	Animal Breeding	2
Animal Husbandry 33,	Incubator Practice	1
Animal Husbandry 34,	Brooder Practice	1

Animal Husbandry 40,	Poultry Seminar	1
Animal Husbandry 42,	Marketing Poultry Products	2
Animal Husbandry 44,	Practice in Packing and Judging Poultry Products	1
Soils 2,	Soil Fertility	4
Veterinary 23,	Comparative Physiology	2
Zoology 8,	Animal Parasites	2
		—
		16
Electives will be selected from list on page 144,	0	to 4
	—	—
Total semester hours	16	to 20

Senior Year

SEVENTH SEMESTER

		Required Semester Hours
Animal Husbandry 9,	Animal Nutrition	2
Animal Husbandry 20,	Animal Feeding	2
Animal Husbandry 30,	Breed Types of Poultry	2½
Animal Husbandry 35,	Experiment Station Work	1
Animal Husbandry 38,	Practice in Poultry Fattening	1
*Animal Husbandry 45,	Poultry Seminar	
Agricultural Journalism 1,	Beginning Journalism	1
Agricultural Journalism 5,	Live Stock Advertising	1
Veterinary 44,	Sanitary Science	2
Veterinary 770,	Anatomy and Physiology of Poultry	2
Economics 9,	Outlines of Economics	3
		—
		17½
Electives will be selected from list on page 144,	0	to 2½
	—	—
Total semester hours	17½	to 20

* Course 45 continues throughout the year. Credit is given at the close of the eighth semester.

EIGHTH SEMESTER

		Required Semester Hours
Animal Husbandry 10,	Thesis	2
Animal Husbandry 15,	Milk Production	1
Animal Husbandry 17,	Advanced Horse Feeding	1
Animal Husbandry 36,	Poultry Research	1
Animal Husbandry 39,	Advanced Poultry Judging	2
Animal Husbandry 45,	Poultry Seminar	1
Agricultural Journalism 2,		1
Bacteriology 16,	Poultry Bacteriology	3½
Veterinary 871,	Poultry Parasites, Diseases and Hygiene	2

Zoology 6,	Evolution of Animals	1
		—
		15½
Electives will be selected from the list on page 144,		⅔ to 4⅔
		—
	Total semester hours	16 to 20

COURSES IN ANIMAL HUSBANDRY

1. **Market Types of Cattle and Sheep.** Includes the judging of different market classes of beef cattle, and sheep, both mutton and wool. Credit, two hours. Three hours' laboratory and one hour lecture per week. Fee, \$2.00.

2. **Market Types of Dairy Cattle, Horses and Swine.** Includes judging different market classes of dairy cattle, light and heavy horses, and swine (bacon and fat). Three hours' laboratory and one hour lecture per week. Two hours' credit. Fee, \$2.00.

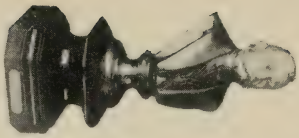
3. **Breed Types of Cattle and Sheep.** Judging representatives of different breeds according to their official standards, a study of their origin, history, characteristics, and adaptability to different conditions of climate and soil. Prerequisite, Animal Husbandry 1. Three and one-third hours' credit. Lectures, two hours and two 2-hour judging periods per week. Fee, \$2.00.

4. **Breed Types of Dairy Cattle, Horses and Swine.** Judging of representatives of different breeds according to their official standards, a study of their origin, history, characteristics, and adaptability to different conditions of climate and soil. Prerequisite, Animal Husbandry 2. Three and one-third hours' credit. Lectures, two hours, and two 2-hour judging periods per week. Fee, \$2.00.

6. **Advanced Live Stock Judging.** Judging horses, cattle, sheep, and swine, especially in groups similar to county and state fair work. Prerequisites, Animal Husbandry 3 and 4, and Zoology 3. One and two-thirds hours' credit. One hour lecture and two 1-hour judging periods per week. Fee, \$2.00.

7. **Herd Book Study.** With a view to becoming acquainted with the pedigrees of the leading strains and families of the different breeds of live stock. Prerequisites, Animal Husbandry 3 and 4. Recitations, two hours per week.

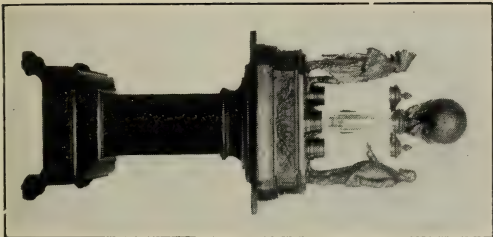
8. **Animal Breeding.** Embraces the principles of animal breeding, especial effort being made to present the results of the most recent investigations along these lines, as well as to unify, where possible, the Mendelian, biometric and older theories. Practical points of breeding and the different systems in vogue occupies the latter half of the semester. Full attention is given to existing stallion importing and other breeding laws as well as to herd book regulations. Prerequisites, Animal Hus-



DIAZ TROPHY



THE SPOON CATTLE TROPHY



THE COOK CORN TROPHY



INTERNATIONAL TROPHY



THE SPOON HORSE TROPHY

INTERNATIONAL TROPHIES WON BY IOWA STATE COLLEGE STUDENTS

bandry 3 and 4, and Zoology 5. Lecture and recitation, two hours per week.

9. **Animal Nutrition.** Process of digestion in the different farm animals, absorption and assimilation, Metabolism under varying conditions, sources and utilization of energy, internal work, maintenance, and factors influencing the digestion of food. Prerequisite, Chemistry 25. Credit two hours. Recitation, two hours per week.

10. **Thesis.** Must be along some line to be arranged with the head of the department. Two hours' credit.

11. **Feeding and Management of Live Stock.** Feed stuffs, the principles of animal feeding and the practical feeding, care and management of breeding and growing beef cattle. Prerequisite, Organic Chemistry, unless by special arrangement with the instructor in charge. Two hours' credit. Lecture, one and one-half hours and laboratory, one and one-half hours per week. Fee, \$2.00.

12. **Feeding and Management of Live Stock.** The practical feeding, care and management of horses, hogs and sheep. Prerequisite, Animal Husbandry 11. Two hours' credit. Lecture, one and one-half hours, and laboratory, one and one-half hours per week. Fee, \$2.00.

13. **Advanced Work in Beef Production.** Successful and economical methods of producing beef cattle, for market purposes; production of baby beef; advisability of long and short feeding periods; and the feeding of grain rations to cattle on grass. Prerequisites, Animal Husbandry 9, and Zoology 8. One hour's credit. Five 1-hour periods per week for first five weeks.

14. **Advanced Work in Pork Production.** Growing and finishing pigs of both the lard and bacon types for market purposes. Prerequisites, Animal Husbandry 9, and Zoology 8. One hour's credit. Five 1-hour periods per week for second five weeks.

15. **Milk Production.** Feeding stuffs and the methods of preparing and feeding same as related to most successful and economical production of milk. Prerequisite, Animal Husbandry 9. One hour's credit. Five 1-hour periods during four weeks, following Animal Husbandry 14.

16. **Advanced Work in Mutton and Wool Production.** Feeding stuffs as related to economical production of mutton and wool. Prerequisites, Animal Husbandry 9 and Zoology 8. One hour's credit. Five 1-hour periods per week following Animal Husbandry 15.

17. **Advanced Work in Horse Feeding.** Growing and developing young animals; most economical and satisfactory rations for horses at light, medium and heavy work; also feeding stuffs best adapted to the production of heavy and economical gains on horses which are being fattened for market. Prerequisites, Animal Husbandry 9, and Zoology 8. One hour's credit. Five 1-hour periods per week following Animal Husbandry 16.

20. **Animal Feeding.** Composition and digestibility of feeding stuffs; the preparation of coarse fodders; the grinding, steaming and cooking of feeding stuffs; feeding standards and the calculation of rations; feeding for meat, milk, wool, growth and work. Prerequisite, Chemistry 13 or 25. Two hours' credit.

21. **Principles of Breeding.** An elementary course embracing the general principles of breeding, selection, variation, heredity, atavism, etc., and a historical study of the results to date. Prerequisites, Animal Husbandry 1 and 2. Two hours' credit.

22. **Animal Husbandry Seminar.** One hour's credit.

23. **Animal Husbandry Seminar.** One hour's credit.

The Animal Husbandry Seminar Courses 22 and 23 meet once each two weeks while college is in session and has for its members the professors and instructors in Animal Husbandry, and all students in the Junior and Senior classes in the course in Animal Husbandry. At each meeting, four students—two Seniors and two Juniors—present papers on associated Animal Husbandry topics. These subjects are selected a half year in advance and follow, in regular series, Animal Breeding, Relation of Animal Husbandry to Other Industries, Animal Feeding, and a study of Live Stock Organizations, Expositions, College and Experiment Station Organization and Equipment.

24. **Ancestry of Domestic Mammals.** A consideration of the forces which have caused a progressive evolution from the primitive hoofed mammals to the domestic mammals of today, combined with a study of the teeth and skeletal modifications, environmental adaptations, family and species relationships and the particularized effects of domestication. Prerequisites, Zoology 2 and 3, Animal Husbandry 8 or 21. One hour's credit, Lecture, one hour per week.

25. **Advanced Types and Breeds of Farm Animals.** Summary and application of principles covered in Animal Husbandry 1, 2, 3 and 4. Two recitations and laboratory combined per week. Fee, \$2.00.

COURSES IN POULTRY HUSBANDRY

30. **Breed Types of Poultry.** Scoring and judging by comparison the more important varieties in accordance with the American Standard of Perfection. Two and two-thirds hours' credit. Lecture one hour and two 2-hour laboratories per week. Prerequisites, Courses 31 and 37. Fee, \$2.00.

31. **Poultry Management.** Poultry buildings, the arrangement of buildings and yards on the general farm, the planning of poultry farms, and feeds and feeding. Two hours' credit. Lectures two hours per week.

32. **Practice in Poultry Feeding and Management.** The student will be given charge of a pen of fowls and will be required to keep a record of the amounts and cost of food consumed, gains made, eggs

produced and calculate the profit or loss. This work will cover a period of three weeks, and the student must be present morning, noon and afternoon, time to be arranged by appointment with instructor. Prerequisite, Courses 31 and 37. One hour's credit. Fee, \$2.00.

33. Incubator Practice. Each student will be given charge of one or more incubators for the period of one hatch and required to keep the records of fuel consumed, temperatures, infertile eggs, dead germs, dead in shell, chicks hatched, and reckon the cost on incubation. This course will cover a period of four weeks and the student must be present morning, noon and afternoon, time to be arranged by appointment with the instructor in charge. Prerequisites, Courses 31 and 37. One hour's credit. Fee, \$2.00.

34. Brooder Practice. Each student will be given charge of chicks in a brooder for four weeks from time of hatching and must keep records of temperatures, fuel and foods consumed, gains made, mortality, and calculate the cost of brooding. The student will be required to be present morning, noon and afternoon, time to be arranged by appointment with instructor. Prerequisites, Courses 31, 33 and 37. One hour's credit. Fee, \$2.00.

35. Experiment Station Work. Experimental work that has been done in poultry in this country. The methods and technique of the more important experiments will be studied in detail. One hour's credit. Prerequisites, Courses 31 and 37.

36. Poultry Research. This course will consist in the working out of some poultry problems. The student will be required to plan in detail an outline for an experiment carrying out the plan in detail and making a complete report on the same. Time by appointment. Prerequisites, Courses 31 and 37. One hour's credit. Fee, \$2.00.

37. Poultry Management. This course continues the work started in course 31 and takes up in a general way, breeding, marketing, incubating and brooding. Two hours' credit. Lecture two hours.

38. Practice in Poultry Fattening. Each student will be given charge of, and feed several lots of fattening stock, comparing different methods and rations for fattening poultry. Records must be kept showing the amounts and cost of food fed, amounts and cost of gains in weight, cost per pound of gain, and calculations made of the profit and loss on each lot of stock. This course will cover a period of three weeks and the student must be present morning and evening, time to be arranged by appointment with instructor. Prerequisites, Courses 31 and 37. One hour's credit. Fee, \$2.00.

39. Advanced Poultry Judging. Lectures and laboratory, two 2-hour periods per week. Prerequisite, Course 30. Two hours' credit. Fee, \$2.00.

40. Poultry Seminar. The poultry seminar meets once every two weeks during the college year. Papers are presented and discussed by members on poultry management, breeding, diseases, poultry organiza-

tions, investigations of poultry farms and packing house and other current topics. Prerequisites, Courses 31 and 37. Time by arrangement. One hour's credit.

42. **Marketing of Poultry Products.** Market classifications of poultry, eggs and feathers, methods of dressing, packing, shipping and selling, requirements of different markets, poultry and egg boards, cold storage of poultry and eggs. Two lectures per week. Prerequisites, Courses 31 and 37. Two hours' credit.

43. **Market Types of Poultry.** Score cards and comparison judging of the various breeds of poultry with reference to market requirements. Prerequisites, Courses 31 and 37. Lectures and laboratories two 2-hour periods per week. Two hours' credit. Fee, \$2.00.

44. **Practice in Packing and Judging Poultry Products.** More modern methods of preparing poultry and eggs for market and judging dressed poultry and eggs. Lectures and laboratory one 2-hour period per week. Must be preceded or accompanied by Course 42. Fee, \$2.00.

45. **Poultry Seminar.** Prerequisite, Course 40. One hour's credit.

Department of Horticulture and Forestry

SPENCER AMBROSE BEACH, PROFESSOR

ARTHUR THOMAS ERWIN, ASSOCIATE PROFESSOR, HORTICULTURE

GILMOUR BYERS MACDONALD, ASSOCIATE PROFESSOR, FORESTRY

NELSON COURTLANDT BROWN, ASSISTANT PROFESSOR, FORESTRY

FRANK WISDOM ALLEN, JR., INSTRUCTOR

GEORGE RAYMOND BLISS, EXTENSION WORK

JOHN REARDON, GARDENER

HORTICULTURE

The Department of Horticulture and Forestry, its orchards, plantations of small fruits and vegetables, forest garden, forest area, pomological and forestal museums, greenhouses, laboratories and library, affords excellent opportunities for instructions and research.

Orchard trees ranging in age from one to more than twenty years represent the hardest types of cultivated fruits both native and foreign and include over a thousand varieties. Several thousand seedling varieties which have been originated in the work in plant breeding are being tested in the orchards and nurseries. Various methods of stratification, layering, budding, grafting and other operations with plants are given practical illustration in the greenhouses and nurseries. Leading types of vegetables are grown to afford opportunity for study in this line of work.

The past few years have witnessed a wonderful development in the science of Forestry due in large part to the increasing scarcity of timber so necessary in the development of every state and community. Large man-



A COLLEGE GREENHOUSE

ufacturers and lumbermen are turning to practical forestry as a means of insuring the permanency of their industries. This is causing an increasing demand for trained men to manage our existing forests, provide for future crops, and reclaim barren non-agricultural lands by tree planting. The Government Forest Service calls for a number of college graduates each year and trains them in scientific forestry work. To meet these numerous demands for men, several colleges and universities, including this one, are giving courses of instruction in Forestry.

About 100 acres of land now available for horticultural and forestal purposes including a recently added tract of sixty acres on which orchards and forest plantations are being developed. Besides this the campus of more than 100 acres affords opportunities for instruction concerning ornamental trees and plants and landscape design.

A large part of the library of the Department is kept in its offices in the Hall of Agriculture where it is available to students specializing in this line of work. Besides a fairly complete collection of publications pertaining to horticulture and forestry and files of numerous periodicals, it also includes the complete library of Charles Downing containing his original drawings and manuscripts and many rare and valuable works on horticulture and forestry.

FORESTRY

During the last decade, forestry has advanced in this country from an almost unknown science to a profession of wide usefulness. In view of the rapidly decreasing supply of available timber and for the better protection of the headwaters of important rivers, the National Government has put under administration approximately 200 million acres of forest lands. This immense area is divided into 150 National Forests each of which requires a staff of trained foresters. The demand for trained men has been steadily increasing and there is every reason to believe that it will increase for many years to come. Owing to the lack of available material, untrained men have been selected locally to administer many of the National Forests. Upon passing the Civil Service Examination for the position of forest assistant in the Forest Service these men are placed in positions of tremendous responsibility where both administrative and executive ability are required. The salary paid on entering the Service is \$1,100 to \$1,200 per annum, depending upon the grade of the examination. Beside this, all expenses are paid whenever the men are on field duty or are absent from their official headquarters. The opportunities for advancement, both in position and salary, are excellent in the Service and the men who have risen to the important positions have been in constant demand by states, private corporations, railroads and lumber companies or associations at much larger salaries than are paid in the Government work.

In the east the work is somewhat different in its nature. During the winter of 1911, Congress passed the Weeks Law which appropriated \$2,000,000 for each of the next five years for the purchase of forest lands in the southern Appalachian and White Mountains. In a few

years, there will be a system of National Forests in the east similar to those in the west and a large number of men will be needed to fill the executive and administrative places that will be open for technically trained foresters. In addition to the men needed for National Forest work in the east, the Forest Service Office, which is maintained at Washington, D. C., employs from 50 to 100 trained foresters who are engaged in administrative, executive, and various lines of research work.

Besides the Government work in this country, the Philippine Forest Service which is maintained as a separate organization in the Philippine Islands, under the War Department, offers excellent opportunities for the future. Men, after passing the Civil Service examination, are eligible for entrance in the Department at a salary of \$1,400 per annum and field expenses, including transportation from this country to the Islands. The demand for men in this work far exceeds the supply and the prospects for the future are excellent.

The need of men for state forestry work is gradually increasing. Many of the states are acquiring title to the poorer classes of land and are holding these as State Forests, for the perpetuation of the timber supply and for the protection of important water sheds. The various states have set aside a total of 3,500,000 acres which are being handled along forestry principles. New York alone has an area of 1,500,000 acres in her state forests and employs ten technically trained foresters. Wisconsin has approximately 400,000 acres reserved and many of the other states have a well established forest policy. In a few years the majority of the states will probably have state forests much the same as in Germany and other European countries. State forest work generally pays from \$2,000 to \$5,000 per annum and men are constantly being drawn upon from the Federal Forest Service to supply the state positions. The future for state forestry work is very bright.

Besides the Government and state work there are good opportunities offered with railroads. Several of the most prominent railroads have already realized the importance of our rapidly vanishing timber supply and are taking up actively the work of planting and managing their forest lands on scientific forestry principles. This work is requiring the employment of a large number of foresters and the demand is steadily increasing. One railroad alone employs seven technical foresters. Large manufacturers and lumbermen are turning to practical forestry as a means of insuring the permanency of their industries. In no other phase of forestry work is the need of technically trained foresters so apparent as with the lumber companies. The larger operators are employing foresters at good salaries to assist in timber estimates and in the management of their holdings.

In the course of "Farm Forestry" the questions that are of greatest importance in the development of forestry in Iowa are considered, such as the establishment, care, and harvesting of the woodlot; the value of wind breaks in protecting crops, and the utilization of the poorer species of woods in connection with preservative treatment. The farm is not complete without its woodlot and shelter belts for the production of

fence posts and fuel, and for the protection of the home grounds, orchard, garden, and stock. Forests have so large a place in the National life that every citizen shares to some extent in the benefits attending their establishment and proper management.

Forestry is housed in the new Hall of Agriculture where ample laboratory and class room is afforded. The museum contains the collection of American woods which was exhibited by Iowa at the Centennial Exposition and a large collection of South American and Philippine Island woods which were on display at the Louisiana Purchase Exposition. It also contains a large number of trunk specimens of trees which afford the student an opportunity to study the bark characteristics of trees not native to this region. About 700 lantern slides are used for illustrating, in the class room, the various phases of forestry work as carried on in different parts of the United States and Foreign Countries. A wooded tract of about 100 acres belonging to the Department serves as a demonstration area and affords ample room for the establishment and maintenance of forest plantations. The College Campus has about 150 different species of trees, and these, together with numerous old plantations in the vicinity give the students a chance to observe the characteristics of many species and also to note the growth of woodlots under varying conditions.

The Department is well equipped for giving prospective foresters a good undergraduate training in forestry, such as will prepare them for work with the United States Forest Service, for State work or for employment with companies requiring technical foresters. A number of the Forestry graduates from the Iowa State College are now in the employ of the Forest Service.

COURSE IN HORTICULTURE AND FORESTRY

For Freshman year, see Agricultural Course, page 79.

Sophomore Year

THIRD SEMESTER

		Required Semester Hours	
		Horticulture	Forestry
Horticulture 36,	Pomology	2	
Horticulture 37,	Orchard Practice	1	
*Agricultural Chemistry 25,	Organic Chemistry	3 $\frac{2}{3}$	3 $\frac{2}{3}$
Agricultural Engineering 4,	Farm Engineering	3 $\frac{1}{3}$	
Botany 63,	Dendrology		1 $\frac{2}{3}$
Botany 68,	Vegetable Physiology	3 $\frac{1}{3}$	3 $\frac{1}{3}$
Forestry 2,	Silviculture		3 $\frac{1}{3}$
*English 11,	Exposition	3	3
Economic Science 9,	Outlines of Economics	3	3
Military 3, or Athletics,		R	R

Total semester hours 19 $\frac{1}{3}$ to 18

* Class 1914 will take Agricultural Chemistry 21 instead of 25, and English 12 instead of 11.

FOURTH SEMESTER

		Required Semester Hours	
Horticulture 38,	Plant Propagation	2	2
Horticulture 39,	Orchard Practice	1	1
Agricultural Engineering 22,	Horticultural Mechanics	1½	
Botany 62,	Dendrology		2½
Botany 66,	Vegetable Pathology	2½	
*English 10,	Narration and Description	3	3
Forestry 3,	Advanced Silviculture		3½
Forestry 16,	Camp Technique		1
Forestry 17,	Forest Development and Policy	2	
Economic Science 23,	Forest Economics		3
Choice {	Economic Science 10,	3	3
	History 6,		
	Europe in the XIXth Century	3	
Zoology 16,	General Zoology	4½	4½
Military 4, or Athletics,		R	R

Total semester hours 19½ 20½

* Class of 1914 will take Agricultural Chemistry 23 instead of English 10 and Botany 61 instead of Horticulture 2.

HORTICULTURE GROUP

Junior Year

FIFTH SEMESTER

		Required Semester Hours
Horticulture 30,	Fruit Judging	1
*Horticulture 28,	Seminar	R
Civil Engineering 305,	Topographical Drawing	1
†Soils 1,	Soil Physics	4
Zoology 4,	Economic Entomology	3½
‡English 12,	Argumentation	2
Civil Engineering 345,	Surveying	2
§Modern Language 5, or 14,	German	5
		—
		18½
Electives will be selected from the list on page 144	0 to	1½

Total semester hours 18½ to 20

* This course must be continued throughout the year. Final standing will not be certified to the recorder until the close of the sixth semester.

† Class of 1913 will take Agricultural Chemistry 25 instead of Soils 1, and Horticulture 5 instead of 33.

‡ Class of 1914 will take Agricultural Chemistry 25 instead of English 12.

§ Or five hours in Literature, History or Economics.



TROPHIES WON BY AMES STUDENTS AT NATIONAL DAIRY SHOW, CHICAGO, DECEMBER, 1908

SWEEPSTAKES FOR BEST ALL-AROUND JUDGING AND THREE BREED CHAMPIONSHIPS

TROPHY WON BY AMES STUDENTS AT NATIONAL HORTICULTURAL CONGRESS, COUNCIL BLUFFS, 1910
(Upper Right Corner)

SIXTH SEMESTER

		Required Semester Hours
Horticulture 34,	Greenhouse Management	2 $\frac{2}{3}$
Horticulture 40,	Small Fruits	2
*Horticulture 28,	Seminar	1
Bacteriology 1,	General Bacteriology	4
Soils 2,	Soil Fertility	4
†Modern Language 6 or 15,	German	5
		—
		18 $\frac{2}{3}$
Electives will be selected from the list on page 144	0	to 1 $\frac{1}{3}$
		—
	Total semester hours	18 $\frac{2}{3}$ to 20

* A continuation of work in fifth semester. Standing will be for the fifth and sixth semesters.

†Or five hours in Literature, History or Economics.

Senior Year

SEVENTH SEMESTER

		Required Semester Hours
Horticulture 4,	Plant Breeding	2 $\frac{2}{3}$
Horticulture 8,	Landscape Gardening	2
Horticulture 9,	Research Work	2
*Horticulture 29,	Seminar	R
Horticulture 33,	Truck Farming	2
Horticulture 35,	Greenhouse Management	1
Agricultural Journalism 1,	Beginning Journalism	1
Botany 24,	Plant Embryogeny	1 $\frac{2}{3}$
History 19,	History of Political Parties	2
Geology 10,	General Geology	4
		—
		18 $\frac{1}{3}$
Electives will be selected from the list on page 144	0	to 1 $\frac{2}{3}$
		—
	Total semester hours	18 $\frac{1}{3}$ to 20

* This course must be continued throughout the year. Final standing will not be certified to the recorder until the close of the eighth semester.

EIGHTH SEMESTER

		Required Semester Hours
Horticulture 10,	Development of American Horticulture	2
Horticulture 13,	Thesis	2
Horticulture 29,	Seminar	1
Horticulture 31,	Landscape Architecture	$\frac{2}{3}$

Agricultural Journalism 2 or 4,	Advanced Journalism or News- paper Management	1	
Botany 70,	Systematic Botany	2 $\frac{2}{3}$	
Soils 13,	Soil Surveying and Mapping	1 $\frac{2}{3}$	
Public Speaking 11,	Extempore Speech	2	
		—	13
Electives will be selected from the list on page 144		3	to 7
		—	—
	Total semester hours	16	to 20

FORESTRY GROUP

Junior Year

FIFTH SEMESTER

		Required Semester Hours
Forestry 4,	Lumbering	3
Forestry 7,	Forest Mensuration	2 $\frac{1}{3}$
*Forestry 18,	Seminar	R
Civil Engineering 557,	Surveying	4
†Soils 1,	Soil Physics	4
Zoology 4,	General Entomology	3 $\frac{1}{3}$
Forestry 5,	Applied lumbering (to be taken during the winter vacation in some lumbering region)	—
		16 $\frac{2}{3}$
Electives will be selected from the list on page 144		1 $\frac{1}{3}$ or 3 $\frac{1}{3}$
		—
	Total semester hours	18 to 20

* This course must be continued throughout the year. Final standing will not be certified to recorder until the close of the sixth semester.

† The class of 1913 will take Agricultural Chemistry 25 instead of Soils 1 and elective work instead of Botany 63.

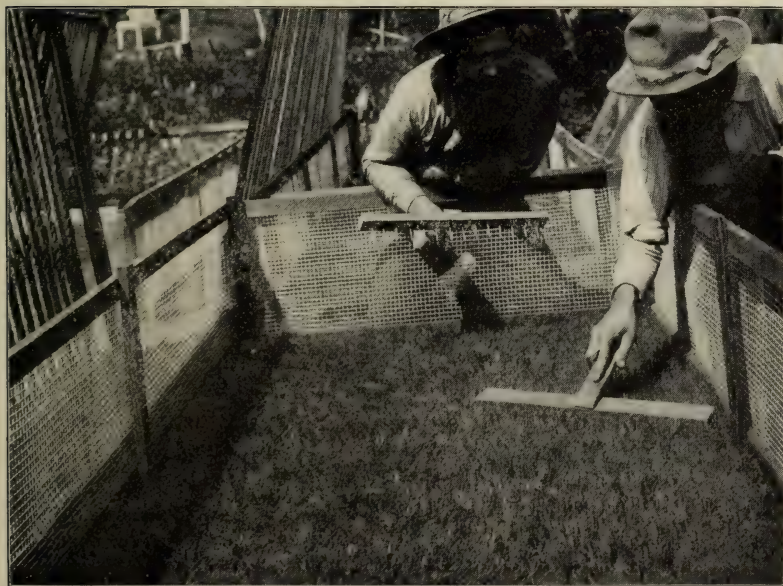
SIXTH SEMESTER

		Required Semester Hours
Forestry 6,	Forest Utilization	1
Forestry 8,	Forest Mensuration	2 $\frac{1}{3}$
*Forestry 18,	Seminar	1

* A continuation of work in fifth semester. Standing will be for the fifth and sixth semesters. One hour credit for both semesters' work will be recorded at close of sixth semester.



PLANTS FOR CREOSOTING FENCE POSTS AT AMES



GROWING YOUNG PINE TREES FOR PLANTING

Civil Engineering 659,	Timber Testing	1 $\frac{2}{3}$
Botany 70,	Systematic Phanerogams	2 $\frac{2}{3}$
Botany 64,	Range Forage Plants and Ecology	1 $\frac{2}{3}$
Civil Engineering 658,	Surveying	4
Soils 2,	Soil Fertility	4

—
18 $\frac{1}{3}$ Electives will be selected from the list on page 144 0 to 1 $\frac{2}{3}$ Total semester hours 18 $\frac{1}{3}$ to 20**Senior Year****SEVENTH SEMESTER**

		Required Semester Hours
Forestry 9,	Forest Management	2
Forestry 11,	Forest Protection	1
Forestry 12,	Forest Administration	2
Forestry 14,	Wood Technology	1 $\frac{2}{3}$
*Forestry 19,	Seminar	
Choice {	Plant Embryogeny	1 $\frac{2}{3}$
	Plant Breeding	2 $\frac{2}{3}$
	General Bacteriology	4
{ Botany 24, and	} 4 $\frac{1}{3}$ or 4	
{ Horticulture 4,		
{ Bacteriology 15,		
Horticulture 8,	Landscape Gardening	2
Agricultural Journalism 1,	Agricultural Journalism	1
English 12,	Argumentation	2
Geology 10,	General Geology	4
Total semester hours		20 or 19 $\frac{2}{3}$

* This course must be continued throughout the year. Final standing will not be certified to recorder until the close of the eighth semester.

EIGHTH SEMESTER

		Required Semester Hours
Forestry 10,	Forest Management	2
Forestry 13,	Thesis	2
Forestry 17,	Forestry Development	2
*Forestry 19,	Seminar	1
Agricultural Journalism 2,	Advanced Journalism	1
Botany 65,	Forest Mycology and Pathology	2⅓
†Soils 13,	Soil Surveying and Mapping	1⅔

* A continuation of work in seventh semester. Standing will be for the seventh and eighth semesters. One hour credit for both semesters' work will be recorded at close of eighth semester.

† The class of 1912 will take elective work in place of Soils 13. Required for class of 1912, Forestry 14, Wood Technology.

History 19,	History of Political Parties	2
Public Speaking 11,	Extempore Speech	2
Zoology 36,	Forest Entomology	2½
		—
		18½
Electives will be selected from the list on page 144	0	to 1½
		—
	Total semester hours	18½ to 20

COURSES IN HORTICULTURE

3. **Orcharding.** The establishment and care of home orchards and vineyards; systematic study of varieties adapted for planting in Iowa. Recitations, two hours, and laboratory, two hours, per week. Two and two-thirds hours' credit. Fee, \$1.00.

4. **Plant Breeding.** Principles of plant breeding and their application to the improvement of plants. Botany 11, prerequisite, and Botany 24, prerequisite or required with this course. Lectures and recitations, two hours, and laboratory, two hours, per week. Two and two-thirds hours' credit. Fee, \$1.00.

8. **Landscape Gardening.** Planting and decoration of home grounds and parks; ornamental trees adapted to planting in Iowa. The ornamental trees and shrubs on the campus and in the department afford excellent material for laboratory work. Two lectures per week. Two hours' credit.

9. **Research Work.** Investigation in some line of work under the supervision of the head of the department. Two hours per week. Two hours' credit.

10. **Development of American Horticulture.** Survey of the development of American Horticulture. Two lectures per week. Two hours' credit.

11. **Amateur Floriculture.** Propagation and general culture of house plants and ornamentals for the lawn, including the planning of home and school grounds. Two hours' credit. Optional eighth semester Agricultural Education and elective in Home Economics 11.

13. **Thesis.** The subject chosen must be one requiring independent investigation, the results of which are to be presented in a carefully written report. May be a continuation of Course 9. Two hours' credit.

28. **Horticultural Seminar.** Seminar in Horticulture will meet once in two weeks while the College is in session, and has for its members the professors and instructors in Horticulture, and all students in the Junior and Senior classes in the course in Horticulture. The work will consist in the preparation, presentation, and discussion of papers on Horticultural topics. The credit in this subject will be reported to the recorder at the close of the spring semester. One hour's credit.

29. **Horticultural Seminar.** A continuation of Course 28. The



DEMONSTRATION IN ORCHARD HEATING BY STUDENTS

credit to be reported at the close of the eighth semester. One hour's credit.

30. **Fruit Judging.** Scoring and judging plate displays and collections of fruit. Special attention given to the leading commercial varieties of the apple. Prerequisite, Horticulture 3. Lectures and laboratory, two hours per week. One hour's credit. Fee, \$1.00.

31. **Landscape Architecture.** Landscape designing. Prerequisite, Horticulture 8 or 11. One laboratory per week. Two-thirds hour's credit.

32. **Landscape Architecture.** A continuation of Course 31 and may be taken simultaneously. One laboratory per week. Two-thirds hour's credit.

33. **Truck Farming.** Growing and marketing of the more important truck crops of Iowa, such as the potato, cabbage, onion and tomato. Two lectures per week. Two hours' credit.

34. **Greenhouse Management.** Greenhouse crops and their cultural requirements, including ventilation, watering and heating. The laboratory work includes routine operations of the green house. Lectures, two hours, and laboratory, two hours, per week. Two and two-thirds hours' credit.

35. **Greenhouse Management.** A continuation of Horticulture 34, designed to give the student practical experience in the various greenhouse operations through the different seasons of the year. One laboratory per week. One hour's credit.

36. **Pomology.** Systematic pomology; commercial orcharding; orchard management; harvesting, grading, packing, marketing, and storing fruit. Prerequisite, Horticulture 3. One lecture and one combined 2-hour lecture and laboratory period. Two hours' credit.

37. **Orchard Practice.** Handling fruit; harvesting, grading, packing, and other orchard operations. Work in some commercial orchard will be assigned for stated periods where the student will get practical experience in the above operations under the direction of the Instructor. One hour's credit.

38. **Plant Propagation.** Propagation of plants by sexual and non-sexual methods, germination, testing and storage of seeds, multiplication of plants by cuttage, layerage and graftage, including nursery methods and management. Recitations, two hours. Two hours' credit.

39. **Orchard and Nursery Practice.** Field practice in transplanting, pruning, grafting, and spraying, including the assignment of special topics in the above subjects. Laboratory four hours per week, last half of the spring semester. One hour's credit. Fee, \$1.00.

40. **Small Fruits.** Culture, harvesting, and marketing of the strawberry, raspberry, grape, currant, and other small fruits. Two hours' credit.

41. **Advanced Work in Greenhouse and Truck Crops.** A continuation of Horticulture 33 and 34, in which the student is afforded oppor-

tunity of specializing in one or the other of these subjects. One hour's credit.

42. **Landscape Materials.** A continuation of Horticulture 8 in which a detailed study is made of the species of shrubbery and other ornamentals used in landscape work. One hour's credit.

COURSES IN FORESTRY

1. **Farm Forestry.** The different parts of the tree; the functions of the different parts; the requirements of trees for light, heat, and moisture; their relation to each other in the forest; a study of the more important commercial species. Attention is given to the influence of forests in the modification of climatic conditions with special reference to the effect of windbreaks in agricultural districts. The establishment of windbreaks, shelter-belts, and farm woodlots in Iowa. The species best suited for planting, kind of stock to plant, cost of planting and care of plantations; seasoning and preservative treatment of farm timbers. This course is designed to treat such problems as are of special interest to the Iowa farmers. Text, *Principles of American Forestry*, by Samuel B. Green. Recitation, two hours per week. Two hours' credit.

2. **Silviculture.** Forest influences such as light, heat, soil, moisture, air and wind in their relation to tree growth; the effects of forests upon climate, precipitation, soil erosion, equalization of stream flow, etc. Forest types, their formation, composition, and relation to forest administration and management; the life history of different types of forests. Methods of classifying different kinds of trees and forests; pure versus mixed forests; coppice versus high forests, etc. Natural reproduction, growth, age, acclimatization, etc. Two lecture hours per week, and four hours' field work on timber tracts, in vicinity of the Campus. Credit three and one-third hours.

3. **Advanced Silviculture.** A continuation of Silviculture 2. The treatment of forests for their continuous use and production; natural and artificial pruning, thinnings, improvement cuttings, etc. The various silvicultural systems of management by which forests are reproduced and maintained both in Europe and in this country. Methods of collecting and storing tree seeds of various species. Testing the vitality of seeds both in the laboratory and field.

General considerations in the establishment of a nursery for the production of forest trees. Preparation of seed beds, methods of sowing, protecting the seedlings, methods of transplanting, heeling in, watering, mulching, field planting, etc., including the cost of all operations. The construction of bird and rodent proof screens for beds; the use of shade screens. Broadcast and seed spot methods of field planting. Actual field operations form an important part of this course. Two hours lecture and recitation and four hours' field work per week. Three and one-third hours' credit.

4. **Lumbering.** History of lumbering in the United States. Work



STUDENTS ON SUMMER RECONNAISSANCE WORK
IN ONE OF THE NATIONAL FORESTS



A TYPICAL VIEW OF A NATIONAL FOREST

preliminary to logging; labor used; the construction of camps; methods of transporting logs by land and water. The cost of the various operations of felling, swamping, skidding, driving, hauling, booming, etc. The development of the manufacture of lumber in the United States. The equipment, output, cost and efficiency of the various types of saw mills from the small capacity portable circular saw mill to the modern double band and gang saw mills. The costs of manufacturing and finishing lumber. The grading, selling, shipping, and marketing of lumber products. During the course typical operations in the various forest regions of the United States will be discussed in detail, giving special emphasis to a comparison of the costs of lumbering and manufacturing. Three hours per week. Three hours' credit.

5. **Applied Lumbering.** Study of logging and milling in a lumbering region. The class will visit logging camps and mills in the region selected and will make a detailed report on all operations from felling of the timber to the marketing of the finished products. Advantage will be taken to visit paper mills, veneer and box board factories, etc. Locations will be selected which will give the students a good insight into practical lumbering. The course will include about three weeks of the winter vacation and will be pursued under the direction of an instructor. The results of the study will be submitted in a report. Prerequisite, Forestry 4, Lumbering. Two hours' credit.

6. **Forest Utilization.** Secondary or minor products of the forest, such as paper pulp, naval stores, tannin, charcoal, wood-alcohol, maple sugar, etc. The utilization of the various commercial timbers in the arts. Lectures and reference work. One hour recitation. One hour's credit.

7. **Forest Mensuration.** Different units used in marketing forest products in this country; the use and construction of log rules and standards, a comparison of the more important rules with their advantages and disadvantages; methods of scaling used in various parts of the country both by lumber companies and on the National Forests. The principles underlying the determination of the contents of logs and trees. Methods of measuring board feet, cubic feet, cordwood, ties, fence posts, etc., on sample plots. The theory and practice of hypsometers, dendrometers, and other instruments of common use in forest work in this country. The use and construction of form factor tables and their application in this country. The construction of height and diameter tables by graphic interpolation. A majority of the work consists of field work on woodlots and sample plots in the vicinity of the campus. Text book—Graves' "Forest Mensuration" and assigned readings. Lecture one hour per week, field work four hours per week, credit two and one-third hours. Fee, \$1.00.

8. **Forest Mensuration.** A continuation of Forestry 7. The construction and use of volume tables by the different methods applicable to

the various types of forest in this country. Systems of estimating timber used on National Forests and by private lumber companies. Application of European methods of estimating timber to conditions in this country. The advantages and disadvantages of the various methods. The age of trees and forests; methods of determining the rate of growth of trees and stands in diameter, height, and volume. Stump and tree analyses. The construction of yield and stand tables and their use in this country. Principles involved in working plans. One hour lecture and four hours' field work or laboratory work per week. Text book, Graves' "Forest Mensuration" and assigned readings. Credit, two and one-third hours. Fee, \$1.00.

9. Forest Management. Management of government, state and private forests. The relation of the various branches of forestry to forest management. The regulation of the forest for the production of a sustained annual or periodic yield. American and European methods of regulation with the adaptation of the latter methods to conditions found in the United States. Forest working plans for National Forests and a comparison with European plans. Two hours lecture and recitation. Two hours' credit.

10. Forest Management and Finance. Forest management adopted in various parts of the country especially on National Forests. The principles underlying the determination of the value of forest lands, with mature timber, young timber or no timber. The cost of growing timber including compound interest on the investment represented. The cost, sale, rental, and expectation value of timber and timber lands. The assessment of damages to forest property especially those resulting from fire. Two hours' lecture and recitation. Two hours' credit.

11. Forest Protection. Injuries to the forest by fire, grazing, trespass, wind, erosion, frost, etc. The establishment of fire lines, look-out stations and patrol routes. Restrictions for railroads crossing National Forests. Care of camp fires. Penalties for violation of laws. Grazing restrictions with regard to goats, sheep, cattle, and horses on National Forests. (Destructive insects and fungi will be considered respectively in courses in Forest Entomology and Forest Mycology and Pathology). One hour lecture with assigned readings. One hour's credit.

12. Forest Administration. The history of the forestry movement in this country. The development of the federal forest policy and conditions which led up to the creation and administration of the National Forests. The management of National and State Forests with particular reference to the silvicultural systems employed in reproducing and maintaining the various types of forest. The organization and work of the Forest Service, the handling of timber sales; the location of administrative sites, the policy of permanent improvements such as ranger cabins, telephones, roads, trails, ferries, bridges, etc., the listing of lands under the Forest Homestead Act of June 11, 1906, the allotment of the range for grazing, reforestation work, the leasing of special sites for water



CLASS IN FOREST MENSURATION MEASURING THE VOLUME OF TREES IN A LARCH PLANTATION
ON THE COLLEGE GROUNDS



CLASS IN FORESTRY MAKING A THINNING ON THE COLLEGE GROUNDS

power projects, irrigation flumes and ditches, railroads, dams, etc., and the use of special forms. Two hours' lecture work per week with assigned reference work. Two hours' credit.

13. **Thesis.** The subject chosen must be one relating to forestry which requires original, independent investigation such as the determination of the volume production of a species of timber on various classes of land. The results of the investigation must be presented in a carefully written report. Six hours per week. Two hours' credit.

14. **Wood Technology.** Economic woods of the United States; means of identification by characters such as grain, texture, color, density, odor, hardness, and toughness. Imperfections of timber such as frost cracks, shakes, resin pockets, loose and sound knots, etc. Causes of shrinking, checking, and warping. Methods of seasoning. The preservative treatment of timbers. In the laboratory the more important species of woods will be distinguished with the aid of the hand lens and again under the compound microscope. Lecture and class work, one hour. Laboratory, two hours. One and two-thirds hours' credit. Fee, \$2.00.

15. **Forest Research.** An independent investigation in some line of forestry work under the direction of the instructors in forestry. Six hours per week. Two hours' credit.

16. **Camp Technique.** Camp equipment, tents, wagons, horses, provisions, bedding, etc. Location of camps, care of camp fires, etc. Packing horses for the trail. One hour lecture, or its equivalent in demonstration work and practice. One hour's credit.

17. **Forest Development and Policy.** History of forestry in foreign countries from the earliest times to the present. Special emphasis is laid upon conditions in Germany and France where scientific forestry has reached its highest development. The advance of forestry in the United States (other than that covered in Forestry 12). The progress of State forestry, chiefly in regard to fire laws, organization, taxation, and development. A few typical states are discussed in detail with particular reference to the above and the management of state reserves, fire protection, state forest laws, reforestation, etc. Text book, Fernow's "History of Forestry." Two hours recitation. Two hours' credit.

18. **Forestry Seminar.** The Forestry Seminar will meet once in two weeks while the College is in session, and have for its members the instructors in Forestry and all students in the Junior and Senior classes in the course in Forestry. The work will consist in the preparation, presentation, and discussion of papers on Forestry topics. All papers must be carefully written and submitted to the professor in charge. The credit in this subject will be reported to the recorder at the close of the spring semester. One hour's credit.

19. **Forestry Seminar.** A continuation of course 18. The credit to be reported at the close of the eighth semester. One hour's credit.

Note—The attention of the student is called to the following subjects which are taught in the course in Forestry by the other Departments of the College:

Dendrology of Gymnosperms, Botany 62;
Dendrology of Angiosperms, Botany 63;
Mycology and Forest Pathology, Botany 65;
Forest Economics, Economic Science 23;
Forest Surveying, Civil Engineering 557;
Forest Surveying, Civil Engineering 658;
Timber Testing, Civil Engineering 659;
Forest Entomology, Zoology 36.

For full description of these courses see descriptive courses under the departments named (Index).

Department of Agricultural Engineering

JAY BROWNLEE DAVIDSON, PROFESSOR

MARTIN FRANCIS PAUL COSTELLOE, ASSISTANT PROFESSOR

CHARLES OSMAND ALEXANDER, ASSISTANT PROFESSOR

DANIEL WILLIS SYLVESTER, INSTRUCTOR

RICHARD RUBEN CLEM, INSTRUCTOR

E. Y. CABLE, EXTENSION WORK

The development of modern agricultural machinery, the increase in the size and importance of farm structures, the improvement of land by drainage and its reclamation by irrigation and the need of better roads, demand that the successful farmer of today must be trained along mechanical and engineering lines. To give instruction in Agricultural Engineering subjects to general agricultural students and to those who desire to specialize in agricultural engineering, and also to investigate problems related thereto, is the work of the Department of Agricultural Engineering.

It is believed that the Department of Agricultural Engineering has the most complete equipment of any similar department in existence. The department occupies the two lower floors of Agricultural Engineering Hall and practically all of Agricultural Engineering Annex, a fireproof building connected with former building on the ground and first floors.

The farm machinery laboratories are located on the ground and first floors of the Annex. Each floor has a large balcony entirely surrounding each room and increasing the floor space by over one-half. A large assortment of the best modern farm machinery is contained in these laboratories.

The farm machinery equipment contains samples of traction engines, gasoline tractors, and one or more samples of almost every kind of the important lines of field and power machine used on the farm. Special apparatus for testing draft adjustment and quality of work is used in connection with these machines, including a Kohlbush direct reading

dynamometer, a Stone and Polikeit recording traction dynamometers, a recording and integrating traction dynamometer designed by the Department, a special chain recording transmission dynamometer of twenty-five horsepower capacity. By means of this instrument it is possible to accurately measure the power consumed by the smallest belt-driven machines as well as those requiring the full capacity of the instrument. Numerous other small instruments and parts of machines are used in this connection.

For instruction in internal combustion engines, eight modern engines are provided, nearly every one representing a different type of construction. To test these, suitable brakes, indicators and other testing appliances are owned by the Department.

The steam engine laboratory contains a simple twenty horsepower engine and a thirty-five horsepower compound reversing engine. Steam is now provided for the college heating plant and boiler practice is obtained from steam tractors. It is hoped to add boilers to the equipment soon.

Two drawing rooms are provided which will accommodate twenty-five and thirty students, respectively. The cement laboratory contains bins for materials, molds, forms, an improved Fairbanks cement testing machine, and smaller apparatus. The pump laboratory contains an assortment of pumps, cylinders, tanks, and the spraying apparatus.

For teaching the course in Farm Engineering, the following instruments are provided: two Gurley transits, one Burger level, five Queen levels, five Gurley levels, one Dietsgen level and two Bostrom and Brady levels; also rods, flagstaffs, chains, hatches, etc.

The Forge shop is equipped with thirty Buffalo and Sturdevant down draft forges and individual tool sets together with a complete set of special tools, a press drill and grinder. The carpenter shop has benches and tool sets for thirty students and a miscellaneous tool equipment is provided in the tool room. This shop is also provided with a power cross cut and rip saw, a planer and two speed lathes.

The work of the Department is carried on in conjunction with the Agricultural Engineering Section of the Agricultural Experiment Station. An experimentalist devotes his entire time to research and is provided with a separate laboratory. This laboratory has many special instruments in the way of dynamometers, indicators, and testing machines, and also a tool equipment including a fourteen-inch engine lathe.

Commodious offices are provided for the members of the Department, in which is to be found a complete implement and farm machine catalog file, also a valuable collection of farm building plans.

COURSE IN AGRICULTURAL ENGINEERING

The work of the Department is principally that of giving instruction to those who intend to make the farm the object of their life work; however, the demand for instructors and others trained along these lines requires the department to offer special instruction to meet this demand.

Positions Open for Men Trained Along Agricultural Engineering Lines.

The course in Agricultural Engineering is designed to fit graduates for the following lines of work:

1. Managers and superintendents of farms, where drainage, irrigation and the use of agricultural machinery is a large factor in the management.
2. Teachers and instructors of Agricultural Engineering in agricultural colleges.
3. Teachers of practical mechanics in Agricultural High Schools.
4. Government experts in Agricultural Engineering.
5. Professional work in drainage and highway engineering.
6. Positions in the farm machinery industry requiring mechanical skill and a knowledge of the science of agriculture.

It is believed that the agricultural engineering course will furnish a good training for those who desire to become consulting engineers in Iowa and other agricultural states.

The degree of Bachelor of Science in Agricultural Engineering (B. S. in A. E.) is given to students who have completed a four-year course in Civil, Mechanical, or Electrical Engineering, followed by one year's prescribed work approved by the faculty, in Agricultural Engineering and related sciences, under the rules and conditions governing work in other courses.

This course is arranged to be especially strong along the fundamental sciences upon which Agricultural Engineering depends.

COURSE IN AGRICULTURAL ENGINEERING

*Freshman Year

FIRST SEMESTER

		Required Semester Hours
Agricultural Engineering 1 or 2,	Shop Work	1½
Agricultural Engineering 25,	Technical Lectures	R
Animal Husbandry 1,	Market Types of Cattle and Sheep	2
English 11,	Exposition	3
Farm Crops 1,	Corn Growing and Judging	2½
History 17,	The American People	1
Horticulture 3,	Orcharding	2½
Mathematics 120,	Algebra	4
Mathematics 121,	Plane Trigonometry	1
Mechanical Engineering 181,	Mechanical Drawing	1
Military 1,	Military Drill	R
Library 1,	Library Instruction	R
		—
	Total semester hours	18½

SECOND SEMESTER

		Required Semester Hours
Agricultural Engineering 1 or 2,	Shop Work	1½
Agricultural Engineering 26,	Technical Lectures	R
Animal Husbandry 2,	Market Types of Dairy Cattle, Horses and Swine	2
Dairying 12,	Farm Dairying	2⅔
English 10,	Narration and Description	3
Farm Crops 2,	Grains, Grasses and Forage Crops	2⅔
Mathematics 222,	Trigonometry	2½
Mathematics 223,	Analytical Geometry	2½
Mechanical Engineering 220,	Descriptive Geometry	2
Military 2,	Military Drill	R
	Total semester hours	18⅔

Sophomore Year

THIRD SEMESTER

		Required Semester Hours
Agricultural Engineering 16,	Farm Machinery	3½
Chemistry 21,	Agricultural Chemistry	4½
Mathematics 324,	Analytical Geometry	2
Mathematics 325,	Calculus	3
Mechanical Engineering 322,	Mechanical Drawing	1
Physics 303,	Mechanics and Heat	5
Military or Athletics,		R
	Total semester hours	18⅔

FOURTH SEMESTER

		Required Semester Hours
Agricultural Engineering 17,	Farm Motors	2
Chemistry 23,	Elementary Experimental Chemistry	4½
Mathematics 426,	Differential and Integral Calculus	5
Mechanical Engineering 401,	Analytical Mechanics	3
Physics 404,	Electricity and Magnetism and Light and Sound	5
Military or Athletics,		R
	Total semester hours	19½

* Freshmen who show deficient preparation in Mathematics may be assigned by the Dean of the Junior College and the Dean of Agriculture, to a special class, with one hour more work than indicated above, and in case of clear indication of failure even with this arrangement they will be dropped from the Freshman work until they have given proof of sufficient preparation to enable them to carry the work successfully.

Junior Year

FIFTH SEMESTER

		Required Semester Hours
Agricultural Engineering 3,	Farm Blacksmithing and Horse-	
	shoeing	1½
Agricultural Engineering 18,	Farm Motors	2
Agricultural Engineering 19,	Farm Building Equipment	1
Horticulture 8,	Landscape Gardening	2
*Agricultural Engineering 14,	Seminar	R
Civil Engineering 345,	Surveying	2
Mechanical Engineering 502,	Analytical Mechanics	5
Mechanical Engineering 512,	Engineering Laboratory	1
Soils 1,	Soil Physics	4
Total semester hours		18½

* This course must be carried throughout the year, and final standing will not be certified to the recorder until the close of the sixth semester.

SIXTH SEMESTER

		Required Semester Hours
Agricultural Engineering 6,	Farm Structures	3
*Agricultural Engineering 14,	Seminar	1
Agricultural Engineering 20,	Drainage and Irrigation	1½
Civil Engineering 653,	Materials of Construction	2
Civil Engineering 446,	Surveying	2
Mechanical Engineering 606,	Analytical Mechanics	5
Mechanical Engineering 613,	Engineering Laboratory	1
Soils 2,	Soil Fertility	4
Total semester hours		19½

* (See note in fifth semester).

Senior Year

SEVENTH SEMESTER

		Required Semester Hours
Agricultural Engineering 10,	Research in Agricultural Engin-	
	eering	2
*Agricultural Engineering 15,	Seminar	R
Animal Husbandry 20,	Animal Feeding	2
Civil Engineering 712,	Roads and Pavements	2
Farm Crops 8,	Farm Management	3

* This course must be carried throughout the year, and final statements will not be certified to the recorder until the close of the eighth semester.

English 12,	Argumentation	2	
Economic Science 9,	Outlines of Economics	3	
Mechanical Engineering 714,	Laboratory	1	
		—	
		15	
Electives will be selected from list on page 144		1½	to 5½
and from the Engineering course of study with the approval of the Dean and the head of the department.			
	Total semester hours	16	to 20½

EIGHTH SEMESTER

		Required Semester Hours	
Agricultural Engineering 11,		3	5
*Agricultural Engineering 15,	Seminar	1	1
History 18,	Political Parties and Party Leaders	1	1
Horticulture 31,	Landscape Laboratory	¾	¾
Mechanical Engineering 533,	Shop Work	2	2
		—	—
		7¾	9¾
Electives will be selected from list on page 144		8¾	to 12½
and from the Engineering course of study with the approval of the Dean and the head of the department.			
	Total semester hours	16	to 20

* (See note seventh semester).

COURSES IN AGRICULTURAL ENGINEERING

1. **Shop Work.** Blacksmithing, forging and welding of iron and steel, and making and tempering hand-tools. Work designed to be especially helpful in the repair and operation of machinery. One and one-third hours' credit. Four hours per week. Fee, \$2.50.

2. **Shop Work.** Carpentry, care, use and sharpening of tools, laying off work, making of joints and framing. Work designed to be especially helpful in planning, framing, and construction of farm buildings. One and one-third hours' credit. Four hours per week. Fee, \$2.50.

3. **Farm Blacksmithing and Horse Shoeing.** An advanced course in blacksmithing. Includes the repair of castings, brazing, plow work and horse shoeing. One and one-third hours' credit. Laboratory, four hours per week. Fee, \$2.50.

4. **Agricultural Surveying.** Includes instruction in the principles of land surveying, also a study of location of drainage districts, drainage laws, and best systems of drainage; irrigation methods and practice; location

and construction of roads; the building of fences and concrete construction in farm work; also drawing, including lettering, map making, planning of drainage systems and road profiles; and field work, including the care, adjustment and practice in the use of surveying instruments. Prerequisite, Mathematics 17. Three and one-third hours' credit. Recitation, two hours, and laboratory, four hours, per week. Fee, \$2.00.

5. **Farm Machinery and Farm Motors.** Mechanics and materials; the measurement and transmission of power; development, construction, functions and methods of operating, adjusting and repairing farm machinery and farm motors; also the principles of draft and the production of power. Laboratory work is devoted to the study of construction, operation, adjustment and testing the machines discussed in the class room. Two and two-thirds hours' credit. Recitations, two hours, and laboratory, two hours. Fee, \$2.00.

6. **Farm Structures.** Planning of all farm buildings, a study of their construction, lighting, ventilation, cost, convenience, also a study of the strength, durability, and cost of building materials, and making of plans and specifications. Prerequisite, Agricultural Engineering 4. Three hours' credit. Recitation, one hour, and laboratory, six hours, per week.

9. **Research Work in Agricultural Engineering.** Subjects for research work, Drainage, Farm Water Supply, Sewerage, Road Construction, Fences, Use of Cement on the Farm, Testing and Calibrating Various Farm Machines and Traction Tests. Prerequisites, Agricultural Engineering 4 and 5 or 16 and 17. Two hours' credit. Fee, \$2.00.

10. **Research Work in Agricultural Engineering.** Work same as in 9. Prerequisites, Agricultural Engineering 4 and 5. Two hours' credit. Fee, \$2.00.

11. **Thesis.** Must be upon some subject requiring original work taken in Agricultural Engineering. Three hours' credit.

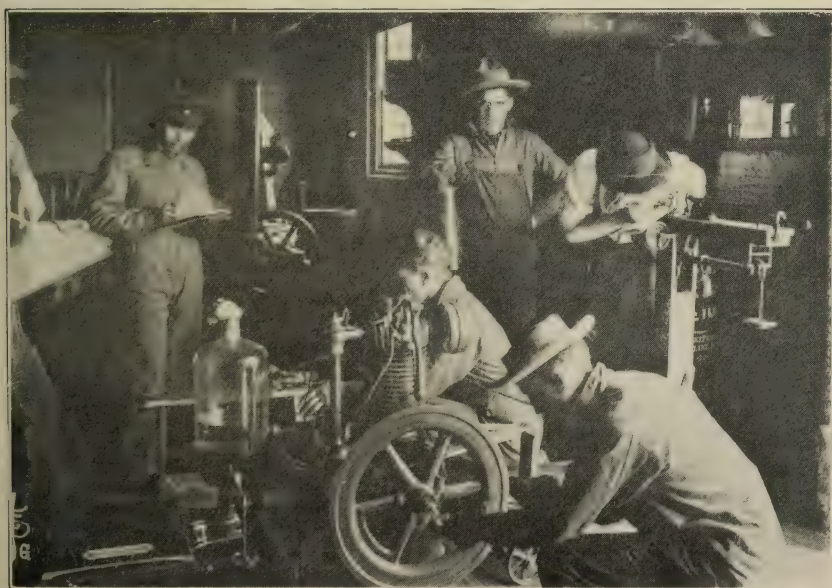
12. **Thesis.** Same as Agricultural Engineering 11, except five hours' credit.

13. **Gas and Oil Engines.** A comprehensive course in the practical operation and management of the internal combustion engine. The course includes a study of the development, the existing types, the theory and practice of operation, the adjustment, the repair and the utility of gas, gasoline, oil, and alcohol engines. The laboratory work will consist of well arranged tests and exercises to familiarize the student with the practical care and management of this type of motor. One recitation and one laboratory period per week. Two hours' credit. Fee, \$2.50.

14. **Agricultural Engineering Seminar.** One hour's credit.

15. **Agricultural Engineering Seminar.** One hour's credit.

The Agricultural Engineering Seminar (Courses 14 and 15) meets once each two weeks while College is in session and has for its members the professors and instructors in Agricultural Engineering and all students in the Junior and Senior Classes in the course in Agricultural Engineer-



TESTING STEAM AND GASOLINE ENGINES

ing. This consists in the preparation, presentation and discussion of papers on Agricultural Engineering subjects. All papers must be carefully written and submitted to the professor in charge. The schedule of subjects is made up one semester in advance.

16. **Farm Machinery.** Elements of machines, the measurement and transmission of power, the development, use, adjustment, construction and repair of farm machinery. Two and two-thirds hours' credit. Recitation, two hours, laboratory, four hours. Fee, \$2.00.

17. **Farm Motors.** The production of power for agricultural purposes. The horse as a motor, tread and sweep powers, steam, gas, gasoline, oil, air, engines, and tractors, windmills, electric power as far as applicable to agricultural purposes. Two hours' credit. Recitation, one hour. Laboratory, three hours. Fee, \$2.00.

18. **Farm Motors.** Continuation of 17. Recitation, one hour, laboratory, three hours. Two hours' credit. Fee, \$2.00.

19. **Farm Sanitation.** The lighting, heating and ventilation of farm buildings. Sanitary construction, plumbing, systems of water supply and sewage disposal. Recitation, one hour. One hour's credit.

20. **Drainage and Irrigation.** The drainage of farm lands by tile drains and open ditches. Drainage engineering methods preliminary and construction surveys, specification, reports and estimates. Drainage law and assessments. Drain tile, ditching and excavating machinery, irrigation methods, application and measurement of water. Recitation one hour. Laboratory two hours. One and two-thirds hours' credit. Fee, \$2.00.

21. **Cement Construction.** The use of cement in farm building construction. Cement testing study mixtures, construction of forms, reinforcements. Also other building materials. One two-hour period per week divided between recitation and laboratory. One hour's credit. Fee, \$2.00.

22. **Horticultural Machinery.** Mechanics and machinery planned especially for horticultural students. Includes orchard machinery, farm motors, spraying apparatus and cold storage building construction. One and two-thirds hours' credit. Recitation one hour and laboratory two hours. Fee, \$2.00.

23. **Dairy Engineering.** Instruction in the management, care and operation of steam and gasoline engines and refrigerating machinery. Laboratory work besides, practice and testing of boilers, engines, and accessories, includes plumbing, soldering, etc. Three and one-third hours' credit. Recitation, two hours, and laboratory, four hours, per week. Fee, \$2.50.

24. **Farm Structures.** Similar to Course A. E. but arranged for agricultural engineering students who have completed the freshman and junior years. Three hours' credit. One hour recitation and six hours laboratory.

25. **Technical Lectures.** Lectures on general agricultural engineering subjects. Also instructions in connection with the shop and other courses required. Includes the instruction given by the college librarian in the use of the catalogue system and reference books.

26. **Technical Lectures.** Course 25 continued.

Department of Agricultural Education

ASHLEY VAN STORM, PROFESSOR

E. C. BISHOP, EXTENSION WORKER

The field of agriculture presents such rapid changes, and there is such wide and varied demand for young men combining agricultural and scientific training, that it has been deemed advisable to offer a course less technical than the other agricultural courses.

The course in Agricultural Education is designed to meet the demands of high schools and other institutions, public and private, giving instruction in the general sciences and agriculture. There is a large demand for strong, broadly educated, well trained teachers for this and other kinds of agricultural instruction in public and preparatory schools where the work is now being introduced.

A new phase of agricultural education has developed in recent years in the various forms of agricultural extension work. This movement is destined to be far-reaching in its results, and it is clearly one of the most potent influences in the field of agriculture. This phase of agricultural instruction, which is bringing science to the aid of agriculture by reaching the man in the field and on the farm, the children in the public school, the family in the home, is calling for well trained men far in excess of the supply.

COURSE IN AGRICULTURAL EDUCATION

*Freshman Year

FIRST SEMESTER

		Required Semester Hours
Botany 61,	Morphology	1½
Mathematics 17,	Algebra and Trigonometry	3
History 3,	Nationality and Democracy	3
Agricultural Chemistry 21,	General Chemistry	4½
Farm Crops 1,	Corn Growing and Judging	2½

* Freshmen who show deficient preparation in Mathematics may be assigned by the Dean of the Junior College and the Dean of Agriculture, to a special class, with one hour more work than indicated above, and in case of clear indication of failure even with this arrangement they will be dropped from the Freshman work until they have given proof of sufficient preparation to enable them to carry the work successfully.

Animal Husbandry 1,	Market Types of Cattle	2	}	2	or	$2\frac{1}{3}$
or	and Sheep					
*Home Economics 1,	Sewing	$2\frac{2}{3}$	}			R
Military 1,						—
						$16\frac{2}{3}$ or 17

SECOND SEMESTER

						Required Semester Hours
Physics 205,	Mechanics, Light and Heat					3
Agricultural Chemistry 23,	Qualitative Analysis					$4\frac{1}{3}$
Zoology 16,	General Zoology					$4\frac{1}{3}$
Public Speaking 2,	The Declamation					1
Farm Crops 2,	Small Grains					$2\frac{2}{3}$
Animal Husbandry 2,	Market Types of Dairy Cattle,	2	}	2	or	$2\frac{1}{3}$
or	Horses and Swine					
*Home Economics 4,	Sewing	$2\frac{2}{3}$	}			R
Military 2,						—
						$17\frac{1}{3}$ or $17\frac{2}{3}$

Sophomore Year

THIRD SEMESTER

						Required Semester Hours
English 11,	Exposition					3
Zoology 4,	Entomology					$3\frac{1}{3}$
Agricultural Chemistry 25,	Organic Chemistry					$3\frac{2}{3}$
Horticulture 3,	Orcharding					$2\frac{2}{3}$
Public Speaking 10,	Extempore Speech					2
Animal Husbandry 3,	Breed Types of Cattle	$3\frac{1}{3}$	}			$3\frac{1}{3}$
or	and Sheep					
*Home Economics 6,	Dress Making	$2\frac{1}{3}$	}	$3\frac{1}{3}$		R
and Elective		1	}			
Military 3 or Athletics,						—
						18

FOURTH SEMESTER

						Required Semester Hours
Botany 26,	Ecology					$1\frac{2}{3}$
Botany 60,	Weeds					$1\frac{2}{3}$
Animal Husbandry 4,	Breed Types of Dairy Cattle,	$3\frac{1}{3}$	}			$3\frac{1}{3}$
or	Horses and Swine					
*Home Economics 7,	Dress Making	$2\frac{1}{3}$	}	$3\frac{1}{3}$		
and Electives		1	}			
Economic Science 14,	Outlines of Economics					2

Horticulture 38,	Plant Propagation	2
Horticulture 39,	Orchard Practice	1
English 10,	Narration and Description	3
Agricultural Chemistry 26,	Agricultural Analysis	3½
Military 4, or Athletics,		R
		—
		18

Junior Year**FIFTH SEMESTER**

Required
Semester Hours

Required:

Soils 1,	Soil Physics	4
Horticulture 4,	Plant Breeding	2½
Botany 24,	Plant Embryogeny	1½
Electives,	(See Notes 2, 3, 4, 5 and 6)	7½ or 11½
		—
		16 or 20

SIXTH SEMESTER

Required
Semester Hours

Required:

Botany 68,	Vegetable Physiology	3½
Soils 2,	Soil Fertility	4
English 12,	Argumentation	2
Electives,	(See Note 1)	3
Electives,	(See Notes 2, 3, 4, 5 and 6)	3½ or 7½
		—
		16 or 20

Senior Year**SEVENTH SEMESTER**

Required
Semester Hours

Required:

Farm Crops 3,	Corn and Small Grain Judging	2
Literature 4,	American Literature	3
Electives,	(See Note 1)	3
Electives,	(See Notes 2, 3, 4, 5 and 6)	8 or 12
		—
		16 or 20

EIGHTH SEMESTER

Required
Semester Hours

Required:

Choice {	Farm Crops 4,	Corn and Small Grain Breed-	} 1½ or 2
		ing	
	Horticulture 11,	Horticulture	
			2

Botany 5,	Vegetable Pathology	3
Electives,	(See Note 1)	3
Electives,	(See Notes 2, 3, 4, 5 and 6)	8½ or 12½
		<hr/>
		16 or 20

Note 1. The student must elect during his course subject to the approval of the head of the department, not fewer than twelve hours from the courses in Agricultural Education.

Note 2. To procure upon graduation a state teacher's certificate without examination, the student must elect from the Department of Psychology and Agricultural Education, not fewer than twenty hours (including those under Note 1) of such work as will meet the requirements of the State Board of Educational Examiners, these electives to be approved by the head of this department.

Note 3. The student, with the approval of the Dean of Agriculture and the head of this department,* will select from the electives on pages 144-146 enough work to make a total of from 16 to 20 hours.

Note 4. Those courses starred (*) are electives for women students.

Note 5. Students taking Home Economics electives will select with the approval of the heads of the Departments of Home Economics and Agricultural Education, from the courses in Home Economics and the prerequisites thereto, enough work to make a total of 16 to 20 hours each semester, which electives must finally include Home Economics 9, 10, 27, 30, 41, 42, 43, 44, and 47.

Note 6. Students electing the Home Economics studies are allowed to substitute Chemistry 22, 24, 58 and 59, for Chemistry 21, 23, 25 and 26, as prerequisites for certain work in Home Economics.

COURSE IN AGRICULTURAL EDUCATION

1. **General Principles of Teaching.** A course in those general principles upon which successful instruction, school management, methods, etc., are based. A text with supplemental texts for reference will be used. Three hours.

2. **General Principles of Teaching.** A continuation of course 1. Three hours.

3. **Principles of Secondary Education.** This course treats particularly of those principles that would prevail in high school, academy or other secondary school work wherein the students are of adolescent age. Two hours.

4. **Principles of Secondary Education.** A continuation of course 3. Two hours.

5. **Educational History.** A course in the History of Education, with special reference to its scientific and industrial phases. Two hours.

6. **Educational History.** A continuation of course 5. Two hours.

7. **General Methods.** A course in the underlying principles of methods of teaching. Two hours.

8. **Special Methods.** A course in methods especially adapted to the teaching of the sciences and industries. Two hours.

Department of Agricultural Journalism

FREDERICK WILLIAM BECKMAN, PROFESSOR

Two main purposes govern the work in the department of Agricultural Journalism:

First, to supplement the student's education in English and give it practical application by teaching him to write for the press clearly, concisely and entertainingly, so that after graduation he may multiply the usefulness of his agricultural training many fold and share his helpful knowledge and experience with the many through the medium of the written word.

Second, to teach those who want to take up agricultural journalism a knowledge of its technical side and to give them training in its rudiments through the actual writing, editing and publishing of the Iowa Agriculturist, a student magazine of recognized high character and wide circulation in Iowa.

The department was established seven years ago through the generous aid of Mr. John Clay of Clay, Robinson & Co., a firm friend of agricultural education and himself a forcible and fascinating writer on agricultural subjects. Its establishment grew out of the conviction of Mr. Clay and others that the country's agriculturists need greater facility in writing and that its agriculture needs "practical men who have polished pens," as he expressed it. "The Book will help more than the Plow in the development of the new agriculture," he said in his notable address on "The Plow and the Book," delivered at Iowa State College when the department was founded.

This department was the first of its kind in the field of agricultural education. Its announcement was then received with no little question and misgiving, both by educators and journalists. The former doubted its educational value; the latter felt that writing for the press could be learned only by actual experience in an editorial office. Now the department stands justified in the opinion of both. It has demonstrated to educators that it adds to the efficiency of training in English and one prominent agricultural college after another has established a similar department. It has demonstrated to journalists that the fundamentals of writing for the press may be taught in college and every year some of them come to this department for young men to take responsible positions in agricultural journalism.

The work of this department has made a strong appeal to the students of the agricultural courses and every year an increasing number of them have enrolled for it. Last year, in response to urgent demand,

the work was enlarged to offer a course in writing for the press to young women of the Home Economics department. This year still another course will be offered to satisfy a demand for training in Agricultural Advertising.

The courses which will be given this year are as follows:

1. **Beginning Journalism.** This course is introductory. Its aim is to teach the student the fundamentals of newspaper writing. It seeks to give him an understanding of what agricultural editors require of contributors and how to meet the requirements with articles written in clear, concise, forceful English. Lectures on the essentials of such writing are combined with actual writing and criticism. Each student is given regular assignments for articles as though he were a member of an editor's staff. His work is submitted for criticism and sometimes is returned for rewriting. Prerequisites, all the required courses in English. One hour's credit.

2. **Advanced Journalism.** This is a continuation of Course 1. It puts special emphasis on the development of originality, individuality and literary excellence. The work is conducted much as in the preceding course. The better articles written by the students are submitted for publication to leading agricultural journals and many of them are accepted. In this course several lectures are given to the class by men prominent in agricultural journalism to bring them in close touch with the practical side of journalism. Another helpful lecture will be given by the Experiment Station Photographer, on "Photography in Its Relation to Journalism." Prerequisite, Journalism 1. One hour's credit.

3. **Beginning Journalism for Women.** This course is open to students of the Home Economics Department. It is similar to course 1 except that it is designed to teach students to write for women's and other journals upon subjects in which women are especially interested as readers. Prerequisites, all the required courses in English. One hour's credit.

4. **Advanced Journalism for Women.** This course is open to students of the Home Economics department. It is similar to Course 2, but like Course 3 is designed to meet the special requirements of Home Economics students. Prerequisite, Journalism 3. One hour's credit.

5. **Newspaper Management.** This course deals with the actual making of an agricultural paper, the "Iowa Agriculturist," a successful student publication of high merit, editorially and typographically. The Editor and Manager of this publication are elected each year by the Agricultural Club, but the staff is chosen by these officers in consultation with the instructor in Agricultural Journalism and includes as far as possible the students who wish to take the courses in newspaper management. This staff meets once each week with the Instructor to plan the issues of the Iowa Agriculturist and to deal with the practical problems of its publication. At these meetings there is informal discussion of such subjects as Newspaper Organization, Newspaper Policies, Planning an Agri-

cultural Journal's Issues, Editing MS., Type Styles and Sizes, Photographic Illustration, Proof Reading, Make-Up, Printing and Printing Machinery, Editorial Writing, Agricultural Advertising, Management and Writing, Circulation Management, and others that arise from time to time. The Instructor in Agricultural Journalism makes no attempt to dictate the policy of the Iowa Agriculturist, that being left to the editor and business manager. Prerequisites, Journalism 1 and 3, or 2 and 4, unless the instructor consents to a requirement of one of these courses only. One hour's credit.

6. **Newspaper Management.** A continuation of Course 5. Prerequisites, same as Course 5. One hour's credit.

7. **Agricultural Advertising.** Deals with the fundamental principles of advertising, especially as applied to the sale of live stock and other farm products. It consists of lectures, the study of current advertising, the practice of writing advertisements and the criticism thereof. It will be offered in the second semester of each year and is open to seniors only. One hour's credit.

Department of Home Economics

CATHERINE J. MC KAY, PROFESSOR

GRACE ELFLEDA RUSSELL, ASSOCIATE PROFESSOR, DOMESTIC ART

GRACE MEDORA VIAL, ASSISTANT PROFESSOR, DOMESTIC SCIENCE

WINIFRED SARAH GETTEMY, INSTRUCTOR

RUTH MICHELS, INSTRUCTOR

IVA L. BRANDT, STUDENT ASSISTANT

NEALE S. KNOWLES, EXTENSION WORK

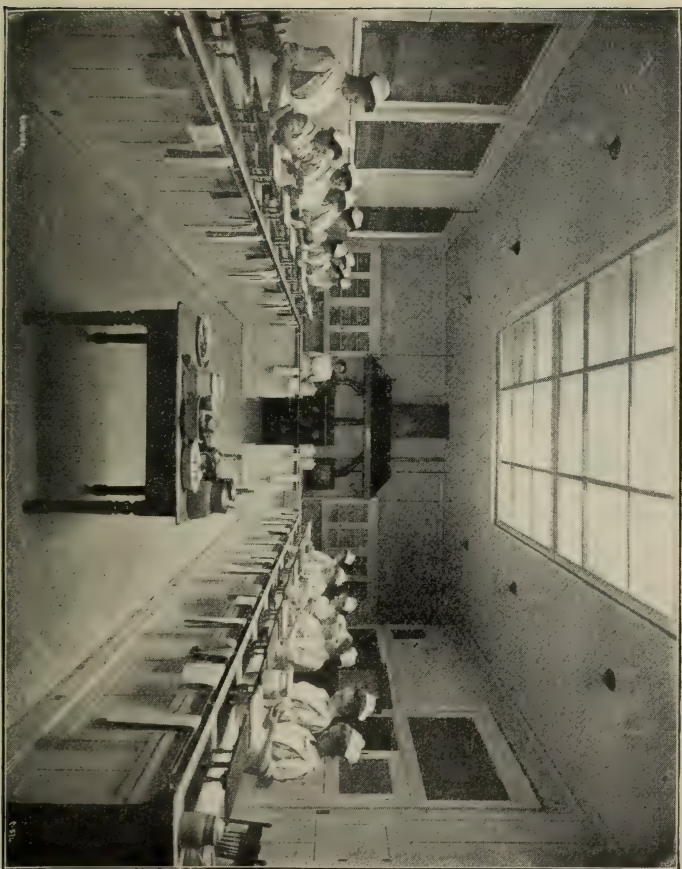
(MRS.) LOUISE H. CAMPBELL, EXTENSION WORK

The Department of Home Economics offers opportunity for scientific and practical work along the lines of Domestic Science and Domestic Art which are unexcelled in any institution in this country.

Woman stands exactly at the point where science most closely touches life. Young women entering upon college training for life responsibilities should be made keenly alive to the fact. It is the right of every young woman who is seeking an education and who expects to do her share of the world's work to have that education to fit her for her special work. It is to this end that the Department of Home Economics is working.

The educational world has and is providing well for the special types of education of men; professional, technical and commercial, which are fitting men for greater proficiency, and greater earning capacity.

It is man's place to provide for the family, woman's work to use the funds provided to secure the best in all lines of expenditure; food, clothing, home furnishings and materials for household maintenance. It is



ONE OF THE COOKING LABORATORIES—HOME ECONOMICS DEPARTMENT

her task to wisely administer the home with well defined economic, scientific, artistic and ethical standards.

Woman's education in the majority of schools has been limited to cultural and disciplinary subjects. Upon the completion of such courses, she has been forced to meet the vital affairs of her life with merely academic training.

That woman's truest sphere of usefulness and therefore greatest joy in living is within the realm of home and its interest, few will contradict. That the average woman is at all times responsible for her own physical well being and nine times out of ten for the physical, moral and mental well being of others dependent upon her as wife and mother, none can deny. Does not such an evident responsibility demand a scientific knowledge of the values of the foods she purchases and prepares for those dependant upon her, those for whose growth and health she is directly responsible? Should she not be able to apply the principles of sanitation to her own house and also to her city? For the clean and unclean condition of any town reacts immediately upon the health of its households.

The course in Home Economics meets a great need, higher education for women, which will apply to the every-day affairs of life. The object of the course is first to teach the proper administration of the home, and with it, to prepare all students who desire to teach the subject of Home Economics. The positions which students graduating in the course of Home Economics are fitted to fill are those of teaching in the public schools of all grades, dietitian work in Hospitals and other institutions, institutional house-keeping, etc. The field of work is unlimited, the demand for college technical women is far greater than can be supplied. No other calling for women presents the human interest and the broad outlook that is found in Home Economics.

THE HOME ECONOMICS BUILDING

The new Home Economics building was erected at a cost of \$75,000.00. There is but one other Home Economics building in the United States which compares with it in beauty and completeness in every detail. The building is of red compressed brick and fire proof structure. It is north of Margaret Hall and faces the north. The ultimate plan is to join the building to Margaret Hall by the addition of two wings, leaving an open court in the center.

On the ground floors are six class-rooms; a large reading room, locker rooms and the laundry. The first floor is occupied by the Domestic Art Division, three large well lighted sewing rooms and fitting rooms with provision for dyeing and pressing. The Home Nursing Demonstration room and the general and private offices are on this floor.

On the second floor are the Domestic Science rooms, three large kitchens finished in white tile, marble and enamel, accommodating twenty students each, large pantries, two dining rooms, a home kitchen, and dining room in which individual work may be done, two large rooms for the Applied Design, a rest room and reception room. Large and beautiful

halls run the length of the building on each floor. The heating is both direct and indirect radiation, the entire amount of air in the building is changed every few minutes, thus providing perfect ventilation. The entire building is being furnished and equipped from the standpoint of utility, simplicity and beauty. It offers to the young woman of the state of Iowa opportunity which few states have offered their daughters. With this excellent home equipment the Department of Home Economics is unhandicapped in meeting the demands of years to come.

COURSE OF STUDY

Freshman Year

FIRST SEMESTER

		Required Semester Hours
Home Economics 1,	Sewing	2½
Home Economics 41,	Personal Sanitation and Hygiene	1
Botany 61,	Morphology	1½
Chemistry 22,	General Chemistry	4½
English 11,	Exposition	3
Choice { Mathematics 4,	College Algebra	} 5
French 1,	Elementary French	
German 5,	Elementary German	
Physical Culture 1,	Marching Tactics	R
Library 1,		
4 hrs. during semester		R
Total hours required		17½
Electives to be selected from Junior College		1 to 2½
		18½ to 20

Note A. These electives, if selected, are to be added to the required hours and cannot afterward be transferred to any other semester.

Note B. Students entering with two entrance units in German may select German 7 and 41 for the first semester and German 8 for the second semester. Where French or German are selected the first semester, they must be continued during the second semester.

SECOND SEMESTER

		Required Semester Hours
Home Economics 4,	Sewing	2½
Botany 68,	Plant Physiology	3½
Chemistry 24,	Qualitative Chemistry	4½
English 10,	Narration and Description	3
History 14,	The West in American History	2
Choice { Mathematics 30,	Trigonometry (plane)	} 3
French 2a,	Intermediate French	
German 6a,	Intermediate German	

Physical Culture 2,	Calisthenics	R
Total hours required		18
Electives to be selected from Junior College on page 140	0	to 2
	18	to 20

These electives, if selected, are to be added to the required semester hours and cannot be afterwards transferred to any other semester.

Sophomore Year

THIRD SEMESTER

	Required Semester Hours
Home Economics 43,	Food Preparation $2\frac{1}{3}$
Home Economics 37,	Home Sanitation 2
Home Economics 50,	Applied Design $1\frac{1}{3}$
*Chemistry 58,	Organic Chemistry $4\frac{1}{3}$
English 12,	Argumentation 2
Physics 301,	Mechanics and Heat 3
Physical Culture 3,	Light Apparatus R
	15
Electives to be selected from page 140	3 to 5
Total hours required	18 to 20

FOURTH SEMESTER

	Required Semester Hours
Home Economics 44,	Food Preparation $2\frac{1}{3}$
Home Economics 51,	Applied Design, Theory of Design $1\frac{1}{3}$
*Chemistry 59,	Food Analysis $4\frac{1}{3}$
Physical Culture 4,	Swedish Gymnastics R
Physics 402,	General Physics 3
Zoology 19,	General Zoology $4\frac{1}{3}$
	15 $\frac{1}{3}$
Electives to be selected from page 140	2 $\frac{2}{3}$ to 4 $\frac{2}{3}$
Total hours required	18 to 20

* Class of 1914 will take Chemistry 24 and 58 instead of Chemistry 58 and 59.

DOMESTIC SCIENCE GROUP

Junior Year

Note 1. Home Economics students who expect to teach should elect work from the Departments of Psychology and Agricultural Education in accordance with the following: By electing Psychology 7 and 8, students, upon graduation, will be entitled to receive, without examination, the Special State Certificate, authorizing them to teach Home Economics (only). Should they desire to receive a General State Certificate authorizing them to teach Home Economics and other subjects also, they should elect in addition to the Psychology above, 10 $\frac{1}{2}$ hours from the courses in Agricultural Education.

Note 2. To students not wishing the General State Certificate, the Home Economics Department recommends that they elect four or more hours from Courses 6, 7, and 8 of the Department of Agricultural Education.

FIFTH SEMESTER

		Required Semester Hours
Home Economics 48,	Cookery	2
Chemistry 60,	Physiological Chemistry	3 $\frac{1}{3}$
Zoology 12,	Human Physiology	4 $\frac{1}{3}$
		<hr/> 9 $\frac{2}{3}$
Electives:	Enough work will be elected from the Senior College electives on page 273 to make 6 $\frac{1}{3}$ to 10 $\frac{1}{3}$	
	Total semester hours required	16 to 20

SIXTH SEMESTER

		Required Semester Hours
Home Economics 42,	Textiles and their Care	2 $\frac{1}{3}$
Home Economics 49,	Cookery	2
Bacteriology 17,	General Bacteriology	3 $\frac{1}{3}$
Zoology 13,	Human Physiology	4 $\frac{1}{3}$
		<hr/> 12
Electives to be selected from page 273,		4 to 8
	Total semester hours required	16 to 20

Senior Year

SEVENTH SEMESTER

		Required Semester Hours
Home Economics 27,	Household Accounts	$\frac{3}{4}$
Public Speaking 15,	Extempore Speech in Home Economics	2
Home Economics 45,	Food and Dietetics	3
Home Economics 9,	Theory of Teaching Domestic Science	1 $\frac{2}{3}$
Home Economics 11,	History of Art	2
		<hr/> 9 $\frac{1}{3}$
Electives to be selected from page 273,		6 $\frac{2}{3}$ to 10 $\frac{2}{3}$
	Total hours required	16 to 20

If Journalism for Women is elected in this semester the student will be required to take Agricultural Journalism 4 as an elective, in the eighth semester.

EIGHTH SEMESTER

		Required Semester Hours
Home Economics 10,	Theory and Practice of Teach- ing Domestic Science	1 $\frac{2}{3}$

Home Economics 12,	History of Art	2
Home Economics 30,	Food Production and Commer-	
	cial Distribution	1
Home Economics 46,	Food and Dietetics	3
Home Economics 47,	Home Nursing	1
Home Economics 53,	Interior Decoration and House	
	Furnishing	1½
*English 13,	Advanced Composition	2

—
12½

For electives see page 273,

3¾ to 7¾

Total hours required

16 to 20

Horticulture 11 elective in Senior year.

* If Journalism for Women is elected through the seventh and eighth semesters, the student may drop English 13 and take two hours elective in its place.

DOMESTIC ART GROUP

Junior Year

Note 1. Home Economics students who expect to teach should elect work from the Departments of Psychology and Agricultural Education in accordance with the following: By electing Psychology 7 and 8 students upon graduation, will be entitled to receive, without examination, the Special State Certificate, authorizing them to teach Home Economics (only). Should they desire a General State Certificate authorizing them to teach Home Economics and other school subjects also, they should elect, in addition to the Psychology, 10½ hours from the course in Agricultural Education.

Note 2. To students not wishing the General State Certificate, the Home Economics Department recommends that they elect four or more hours from courses 6, 7, and 8 of the Department of Agricultural Education.

FIFTH SEMESTER

		Required Semester Hours
Home Economics 6,	Dress Making	2½
*Chemistry 61,	Chemistry of Textiles	3½
Zoology 12,	Human Physiology	4½

—
10

Electives to be selected from page 273,

6 to 10

Total semester hours

16 to 20

* Class of 1914 will take Chemistry 59 instead of 61.

SIXTH SEMESTER

		Required Semester Hours
Home Economics 7,	Dressmaking	2½
Home Economics 42,	Textiles and their Care	2½
Home Economics 52,	Costume Design	2

Bacteriology 17,	General Bacteriology and Fermentation	3
Zoology 13,	Human Physiology	4½
		—
		14
Electives to be selected from page 273,	2	to 6
	—	—
	Total semester hours	16 to 20

Senior Year

SEVENTH SEMESTER

		Required Semester Hours
Home Economics 11,	History of Art	2
Home Economics 9,	Theory and Practice of Teaching Home Economics	1½
Home Economics 33,	Advanced Dress Making	2
Home Economics 34,	Advanced Course in Textiles	1½
Home Economics 54,	Textile Design	1½
Public Speaking 15,	Extempore Speech in Home Economics	3
		—
		11½
*Electives to be selected from page 273,	4½	to 8½
	—	—
	Total semester hours	16 to 20

* If "Journalism for Women" is elected in this semester the student will be required to take Journalism 4 as an elective in the eighth semester.

EIGHTH SEMESTER

		Required Semester Hours
Home Economics 12,	History of Art	2
Home Economics 10,	Theory and Practice of Teaching Home Economics	1½
Home Economics 35,	Millinery	1½
Home Economics 53,	Interior Decoration and Household Furnishing	1½
*English 13,		2
		—
		8½
Electives to be selected from page 273,	7½	to 11½
	—	—
	Total semester hours	16 to 20

* If "Journalism for Women" is elected through the seventh and eighth semesters, the student may drop English 13 and take two elective hours in its place.

Junior College Electives

Subjects which may be elected in the Freshman and Sophomore years in the Home Economics Course and which are called Junior College electives.

(The number in the parenthesis indicates the number of hours' credit).

Botany 4 (5), 12 (4), 15 (3), 28 (5).

Civil Engineering 101 (1), 308 (4).

Dairying 10 (2).

Home Economics 1 ($2\frac{1}{3}$), 4 ($2\frac{1}{3}$), 37 (2), 42 (2), 43 ($2\frac{1}{3}$), 44 ($2\frac{1}{3}$), 47 (1), 50 ($1\frac{1}{3}$), 51 ($1\frac{1}{3}$).

Economic Science 9 (3), 16 (3).

English 13 (2).

History 5 (3), 6 (3), 22 (2).

Horticulture 8 (2), 31 ($\frac{2}{3}$), 34 ($2\frac{2}{3}$), 35 (1).

Languages 1 (5), 2 (5), 3 (3), 4 (3), 5 (5), 5a (3), 6 (5), 6a (3), 7 (3), 8 (3), 16 (3), 17 (3), 18 (3), 19 (3), 20 (3), 21 (3), 24 (3), 25 (3), 27 (3), 28 (3), 29 (1), 30 (5), 31 (5), 36 (3), 40 (2), 41 (2), 51 (3), 52 (3).

Literature 1 (3), 2 (5), 5 (5), 8 (2), 10 (3), 11 (2).

Mathematics 4 (5), 8 (5), 9 (5), 30 (3), 31 (3), 223 ($2\frac{1}{2}$), 324 (2), 325 (3), 426 (5).

Mechanical Engineering 181 (1).

Psychology 7 (3), 8 (3).

Public Speaking 2 (1), 3 (2).

Zoology 5 (3), 7 (5), 14 (3), 17 (3).

Senior College Electives

Note—The list of electives for Junior and Senior Classes in Home Economics Course will be found by referring to the list of electives found on page 273, under the heading of Senior College Electives, Science Division.

COURSES IN HOME ECONOMICS

Domestic Art

1. **Sewing.** Drafting of patterns and hand sewing, including stitches, darning, patching, the making of button holes, etc., all of which will be applied to some useful garment. One recitation, two 2-hour laboratories. Two and one-third hours' credit. Fee, \$1.00

4. **Sewing.** Advanced drafting, hand and machine sewing, silk skirts, slips or tailored skirts and tailored waists will be made. Economical cutting of material, fitting of garments, and choice of materials will be discussed from the standpoint of economy and beauty. Prerequisite, Home Economics 1, one recitation, two 2-hour laboratories. Two and one-third hours' credit. Fee, \$1.00.

6. **Dressmaking.** Designing of patterns and the making of fancy

waists. In this course the students will be allowed to make some garment that will be especially useful to them along the line of wearing apparel. Special emphasis is given to the artistic side of the work and the history of costume. Prerequisite, Home Economics 4. One recitation and two hour laboratories. Two and one-third hours' credit. Fee, \$1.00.

7. **Dressmaking.** Continuation of Home Economics 6. Making of a thin unlined dress. Lessons on making of girdles and ribbon bows and other methods of work suitable for trimming purposes. Prerequisites, Home Economics 6 and Applied Design. One recitation, two 2-hour laboratories. Two and one-third hours' credit. Fee, \$1.00.

11. **History of Art.** Historic architecture and ornament including the Egyptian, Greek, Roman, Byzantine, and Renaissance styles and consideration of architecture of the present day. The object is to develop within the student the aesthetic instinct and an appreciation for the elements of architecture. Two hours recitation. Two hours' credit. Prerequisite, Home Economics 51.

12 **History of Art.** Sculpture and painting from the Egyptian age up to the present time. Special emphasis on the study of schools and masters of different countries and periods. Giotto and his school. Art of the Renaissance, Venetian, Spanish, and Dutch schools and American Art. Two hours' recitation. Two hours' credit. Prerequisite, Home Economics 11.

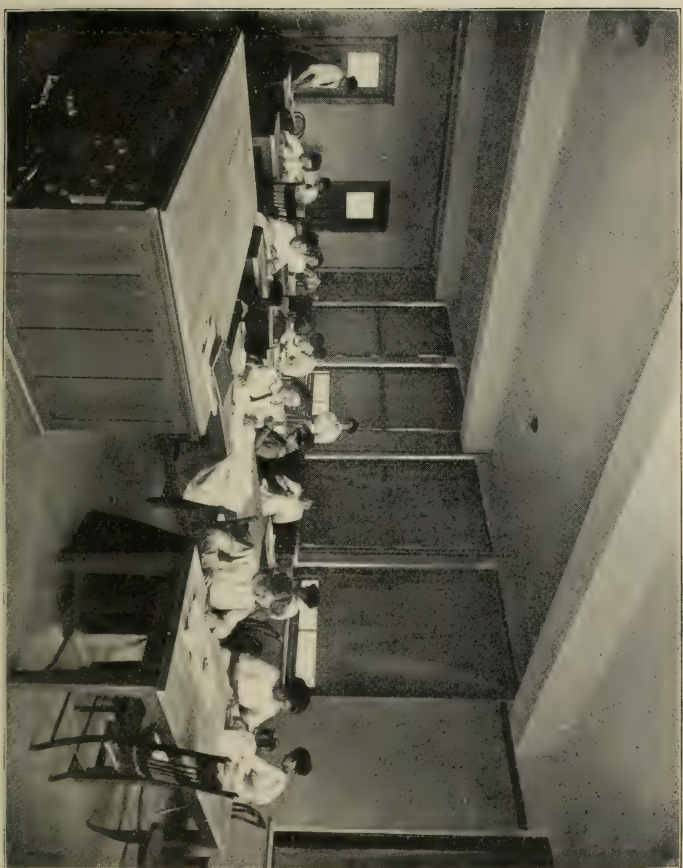
33. **Advanced Dress Making.** Elaborate costume pattern designing and the making of a street, house and evening gown. Prerequisites, Home Economics 7, and Design 52. Three two-hour laboratories. Two hours' credit. Fee, \$1.00.

34. **Advanced Course in Textiles.** Applied Design 54 will be put into practice in loom weaving, basket making, embroidering, crocheting, and knitting. Especially helpful to those wishing to teach in High Schools, Normals and Colleges. Prerequisite, course 42. Two two-hour laboratories. One and one-third hours' credit. Fee, \$3.00.

35. **Millinery.** Designing and drafting patterns for hats; construction of different kinds of frames such as buckram, wire, willow; also covering and finishing with velvet, straw, net, etc. Emphasis is laid on the placing on the trimming and the use of original designs, also the renovating of hats, curling of feathers, freshening velvets, ribbons, etc. Two two-hour laboratories. One and one-third hours' credit.

42. **Textiles and Their Care.** Fabrics, also the evolution of spinning and weaving from their beginnings in primitive life to the present day. Laboratory work will include laundering, dyeing of cotton, wool, silk and linen, simple weaving, and other work especially suitable for textiles in the home. Prerequisite, Applied Design 50. One recitation and two two-hour laboratories. Two and one-third hours' credit. Fee, \$2.00.

50. **Theory of Design.** Theory of Design. Principles, color analy-



ONE OF THE SEWING LABORATORIES -- HOME ECONOMICS DEPARTMENT

sis, tone value, harmony, rythm, balance, subordination. These principles are first applied to simple abstract problems of borders, surface patterns and regular spaces. Two two-hour laboratories. One and one-third hours' credit. Fee, \$1.00.

51. **Applied Design.** Principles of design applied to concrete problems such as: Rugs, Book-covers, Stained Glass Windows, etc., and later through the mediums of leather, metal, wood-block prints and stencils applied to various useful articles. Prerequisite, Home Economics 50. Two two-hour laboratories. One and one-third hours' credit. Fee, \$1.00.

52. **Costume Design.** Designing and sketching of costume. It aims to give emphasis to the aesthetic side of dressmaking and millinery. The principles of design applied to color combinations, proportions, and trimming arrangements for various articles of clothing. Prerequisites, Home Economics 50 and 51. Two two-hour laboratories. One and one-third hours' credit. Fee, \$1.00.

53. **Household Furnishing and Interior Decoration.** Principles of art in their application to home furnishing and every-day living. Interior mural decorations, floors, furniture, household linens, china, silver, and pottery are taken up from the standpoint of color combination and beauty of line as well as utility and economy. Practical work in design will be given which can be applied directly to house furnishings. Prerequisite, Home Economics 54. One hour lecture. Two hours' laboratory. One and two-thirds hours' credit. Fee, \$1.00.

54. **Textile Design.** Designs for various articles which are to be executed in the advanced Textile class. Loom weaving for rugs, weaving of baskets, embroidery on linen, monograms, and designs for embroidered table runners and pillow covers. Prerequisites, Home Economics 50 and 51. One hour lecture. Two hours' laboratory. One and two-thirds hours' credit. Fee, \$1.00.

DOMESTIC SCIENCE

9. **Theory and Practice of Teaching Home Economics.** The working out of the relation of the subjects of instruction included in a complete Home Economics Course; the relation of these to other subjects in the school curriculum, the organization of practical information needed by a teacher in introducing and conducting this work, such as, the planning of courses, the cost of equipment, the management and care of the department, the presentation of lessons. The laboratory work consists of practice teaching; school classes; assisting in college classes; observations. Recitation, one hour. Laboratory, one period. One and two-thirds hours' credit. Fee, \$3.00.

10. **Theory and Practice of Teaching Home Economics.** Continuation of Home Economics 9. Recitation, one hour. Laboratory, one period. One and two-thirds hours' credit. Fee, \$3.00.

27. **Household Accounts.** Methods and forms which can be readily adapted to the business of the household. Banking, renting, forms of contracts, etc., are taken up and discussed in their relation to the home. Systems of household bookkeeping will be studied and household and personal accounts kept. The Division of Income will be discussed and the approximate amount to be spent upon Rent, Fuel, Clothing, Food, Lighting, etc., considered. Two-thirds hours' credit. One laboratory per week.

30. **Food Production and Commercial Distribution.** This course consists of lectures upon the staple foods, their production, manufacture and distribution from the raw material to the finished product. Discussions of the composition and the cost of food materials, the process of preservation of foods, such as canning and preserving of foods, salting, smoking, drying, use of preservatives, adulteration and substitution. Also a resume of the state and national laws governing the distribution of food. Recitation, one hour. One hour's credit.

37. **House Structure and Sanitation.** How to use and care for the equipment of homes and institutions, with particular reference to sanitary aspects. How modern appliances may be either nuisances or sources of comfort, according as one learns to make intelligent use of them. The course will deal with water supply, stoves, lamps, gas supply, plumbing, sewers, garbage, heating, ventilation, refrigeration, electric lighting, telephone, elevators, dumb waiters, mechanisms of machinery for dish washing, laundry, and cleaning; destruction of pests, sanitary cleaning; effects of sunlight and fresh air; fire extinguishers and general repairs. Prerequisites, Home Economics 41 and Chemistry 22. Two hours' credit. Recitation, two hours per week.

41. **Personal Sanitation and Hygiene.** A lecture course upon the sanitary care of the person, clothing and surroundings, discussion of social and ethical questions which arise in community and college life. One hour's credit.

43. **Food Preparation.** This course introduces the subject of foods and food preparation in its scientific and economic aspect. It is the study of the nutritive principles as they are found in various foods and the methods of cooking foods to retain those principles in digestible form; serving of foods in simple and attractive form. Economy of money, time and labor being considered. One recitation and two two-hour laboratories per week. Prerequisite, Chemistry 22. Two and one-third hours' credit. Fee, \$4.00.

44. **Food Preparation.** A continuation of 43. Two and one-third hours' credit. Fee, \$4.00.

45. **Food and Dietetics.** Includes a thorough and scientific study of food materials in their relation to the daily dietary of families under various conditions of health and environment. Also takes up institutional dietaries; the relation of dietetics to various diseases; the feeding of children. The practical work in this course is advanced

cookery, therapeutic cookery, and the preparation of actual meals according to various dietary standards. Prerequisites, courses 43, 44, 48 and 49. Fee, \$7.00. Three hours' credit.

46. **Food and Dietetics.** Continuation of course 45. Three hours' credit. Fee, \$7.00.

47. **Home Nursing.** Study of the scientific care of the patient under home conditions, including the furnishing, temperature and ventilation of the room, bathing, dressing and administering food and medicine to patients, bed making, bandaging, lifting helpless patients, preparation and application of fomentations. Prerequisites, Bacteriology 17 and Home Economics 37. One hour's credit.

48. **Cookery.** Study of foods and relation of same to the body, reviews of chemistry and physiology of digestion, study of fermentation in its relation to fruit preservation, marketing and serving and fruit preservation forms the laboratory work. An opportunity is given for practice in home cookery—includes the study, planning, marketing, preparation and serving of meals. Prerequisites, Home Economics 43 and 44. One recitation and two two-hour laboratories per week. Credit, two hours. Fee, \$3.00.

49. **Cookery.** Continuation of 48. Two hours' credit. Fee, \$3.00.

ELECTIVES IN THE AGRICULTURAL COURSES

Subjects which may be elected in the Junior or Senior Year in any of the Agricultural courses, provided the student has the prerequisites for each study chosen:

Semester. Department. Course Numbers, and Hours.

First Agricultural Chemistry 27 (3 or 5), 40 (3½).

Second Agricultural Chemistry 26 (3½), 34 (3½ or 5), 56 (5).

First Agricultural Engineering 1 (1½), 2 (1½), 3 (1½), 4 (3½), 10 (2), 13 (2), 16 (2 ⅔), 18 (1), 19 (1).

Second Agricultural Engineering 1 (1½), 2 (1½), 5 (2½), 6 (3), 9 (2), 13 (2), 17 (1), 20 (1½), 21 (1), 22 (1½).

First Agricultural Journalism 1 (1), 3 (1), 5 (1).

Second Agricultural Journalism 2 (1), 4 (1), 6 (1), 7 (1).

First Animal Husbandry 9 (2), 11 (2), 20 (2), 21 (2), 25 (1), 30 (2½), 31 (2), 32 (1), 35 (1), 38 (1).

Second Animal Husbandry 7 (2), 12 (2), 24 (1), 33 (1), 34 (1), 36 (1), 39 (1), 42 (2), 44 (1).

First Bacteriology 1 (4).

Second Bacteriology 1 (4), 5 (4).

First Botany 4 (5), 10 (2), 13 (2), 14 (2), 60 (1½), 66 (2½), 69 (1½), 71 (1½), 72 (1½).

Second Botany 12 (4), 23 (1 to 5), 68 (3½), 70 (2½).

First Civil Engineering 308 (4).

Second Civil Engineering 409 (4), 713 (2).

First Dairying 11 (3), 16 (1), 26 (1), 14 (5), 17 (4).

- Second Dairying 12 ($2\frac{2}{3}$), 13 ($1\frac{2}{3}$), 20 ($3\frac{1}{3}$), 21 ($1\frac{2}{3}$), 24 ($2\frac{1}{3}$), 27 (1).
- First Economic Science 1 (5), 3 (3), 7 (2), 9 (3), 13 (1), 17 (2), 19 (2), 22 (3).
- Second Economic Science 4 (2), 5 (3), 6 (2), 10 (3), 16 (3), 20 (1), 21 (2).
- First English 12 (2), 13 (2).
- Second English 12 (2).
- First Farm Crops 3 (2), 8 (3), 10 (2), 11 (1), 21 ($\frac{1}{3}$).
- Second Farm Crops 4 ($1\frac{2}{3}$), 10 (2), 12 ($1\frac{2}{3}$), 18 (5), 17 (2).
- First Forestry 2 (2), 4 (3), 5 (2), 9 (2), 11 (1), 12 (2), 19 (R).
- Second Forestry 1 (2), 3 (2), 6 (1), 10 (2), 14 ($1\frac{2}{3}$), 16 (1), 17 (2), 18 (1), 19 (1).
- First Geology 10 (4), 501 (4).
- Second Geology 607 (4), 805 (4), 2 (4), 6 (4), 9 (2).
- First History 3 (3), 5 (3), 6 (3), 7 (2), 10 (2), 12 (2), 24 (2).
- Second History 4 (3), 5 (3), 6 (3), 9 (2), 11 (2), 22 (2).
- First Horticulture 4 ($2\frac{2}{3}$), 8 (2), 30 ($\frac{2}{3}$), 33 (2), 36 (2), 37 (1).
- Second Horticulture 11 (2), 31 ($\frac{2}{3}$), 38 (2), 39 (1), 40 (2), 41 (1), 42 (1), 32 ($\frac{2}{3}$).
- First Modern Languages:
 Language (French) 1 (5), 3 (3).
 Language (German) 5 (5), 14 (5), 16 (3).
 Language (Spanish) 30 (5).
- Second Modern Languages:
 Language (French) 2 (5), 4 (3).
 Language (German) 6 (5), 15 (5), 17 (3).
 Language (Spanish) 31 (5).
- First Literature 1 (3), 4 (3), 6 (2), 8 (2), 14 (2), 18 (2), 19 (2), 20 (2), 21 (2).
- Second Literature 2 (5), 3 (3), 5 (5), 7 (2), 10 (3), 11 (2), 13 (2), 14 (2), 19 (2).
- First Mathematics 4 (5), 8 (5), 324 (2), 325 (3).
- Second Mathematics 6 (2), 9 (5), 223 ($2\frac{1}{2}$), 426 (5).
- First Military 5 (1), 7 (1).
- Second Military 6 (1), 8 (1).
- First Physics 511 (1).
- Second Physics 404 (5).
- First Psychology 6 (3), 7 (3), 8 (3), 10 (2), 11 (2).
- Second Psychology 2 (3), 3 (3), 4 (3), 6 (3), 7 (3), 8 (3), 10 (2), 11 (2).
- First Public Speaking 2 (1), 3 (2), 5 (2), 10 (2), 16 (1), 17 (1).
- Second Public Speaking 2 (1), 4 (2), 6 (2), 8 (1), 11 (2), 18 (1).
- First Soils 1 (4), 4 (2), 6 (2), 8 (4), 13 ($1\frac{2}{3}$).
- Second Soils 2(4), 3 (2), 7 (1), 14 (3), 15 (2), 16 (2).
- First Veterinary 19 (1), 23 (2), 33 (3), 44 (2).
- Second Veterinary 22 ($2\frac{2}{3}$), 24 (2).

- First Zoology 4 ($3\frac{1}{3}$), 10 (3 or 5), 12 ($4\frac{1}{3}$), 18 (2), 20 ($4\frac{1}{3}$), 19 ($2\frac{2}{3}$), 30 (5).
- Second Zoology 3 (5), 6 (1), 7 (5), 8 (2), 10 (3 or 5), 13 ($4\frac{1}{3}$), 17 (3).

Remunerative and Instructive Labor

The Agricultural Courses afford opportunity to do considerable work in the fields and about the barns and grounds. The compensation for services of this kind ranges from eight to fifteen cents per hour according to the merit of the work. Thus students are enabled not only to earn part of their expenses but also to materially strengthen the practical side of their education. A number of the strongest and most capable students are aided in finding employment during vacations with successful stockmen on good farms and in various other positions in line with their chosen work. Some who have taken a year of practical work in this way during their course have found it of marked benefit, and it has enabled them to command more desirable and remunerative positions at the completion of their College course. Too much emphasis cannot be placed on a thorough understanding of the practical application of correct principles of agriculture.

Credit for Practical Work

Agricultural students who, by previous agreement with the head of the department, do practical work on farms, horticultural or feeding or breeding establishments, beet sugar factories or forestry reservations, of recognized standing, during their course of study will be allowed credits on the following basis: Students who take practical work of the kind described under the direction of the proprietor and render competent and faithful service, will, on their return to College and on the presentation of a concise written report or resume of their observations and experience, be entitled to the following credits in the four-year courses in Agriculture:

For three months, five hours of elective work in the Junior or Senior year; for six months, eight hours; and for one year, ten hours; no more than five hours of which shall be credited in any one term of the College course.

Students must have at least six months of practical work before graduation, but credit will be given for such work only as stated above.

Department of Agriculture Scholarships

The State Department of Agriculture offers scholarship prizes in this institution amounting to \$1000. These scholarships are awarded at the Iowa State Fair, based upon boys' stock and grain judging contests and girls' cooking contests. There are five scholarships for boys, ranging from \$200 to \$25, and four for girls, ranging from \$100 to \$25. The winners of the contest receive the money in monthly installments during the year of college work, with the exception of the \$25 scholarship which applies upon the two weeks short course. These scholarships offer op-

portunities for young men and women to receive substantial aid toward paying the expenses of a college education and many excellent students have come to the institution by this means.

Armour Scholarships

Mr. J. Ogden Armour of Chicago has donated \$5,000 annually for scholarships at the International Live Stock Exposition. The award of these scholarships is based upon the competition of the students and stock exhibits of the various agricultural colleges. The Iowa State College has been fortunate in winning more than twice as many of these as any other institution, and about \$5,000 worth of scholarships have been awarded to worthy farm boys of Iowa who are dependent upon their own resources in obtaining a college education. These scholarships of \$250 each are awarded annually at the close of the two weeks' short course held in January and the award is based upon a competitive examination in stock and grain judging.

The Clay, Robinson & Company Fellowship

Since the organization of the International Live Stock Exposition, Clay, Robinson & Company of Chicago have offered \$1,000 annually to be competed for by the various Agricultural Colleges in their live stock exhibits at the International. This institution has always won a large share of these premiums and the funds have been used to provide for a fellowship in Agriculture to aid worthy students in advanced study. These fellowships have materially aided young men to make a better and more thorough preparation for Agricultural teaching and investigation and for practical work on the farm.

For further information about any of the scholarships or fellowships address the Dean of Agriculture.

Agricultural Short Courses

(Non-collegiate)

OFFICERS OF INSTRUCTION

EDGAR WILLIAMS STANTON. *1877, 1874..Acting President, Dean of Junior College, Dean of Division of Science, Professor of Mathematics.

B. Sc., Iowa State College, 1872; M. Sc., 1887; LL. D., Coe, 1904.

CHARLES FRANKLIN CURTISS. 1897, 1891..Dean of the Division of Agriculture, Director of Experiment Station.

B. S. A., Iowa State College, 1887; M. S. A., Iowa State College, 1892; D. Sc. in Agriculture, Michigan Agricultural College, 1907.

ASSOCIATE PROFESSOR

ELIZABETH MACLEAN. 1908, 1899...Associate Professor of English
B. Di., State Normal, Iowa, 1894; M. Di., 1900; B. Ph., Chicago, 1909.

ASSISTANT PROFESSORS

MARK G. THORNBURG....Assistant Professor of Animal Husbandry
B. S. A., Iowa State College, 1910.

CLAUDE KEDZIE SHEDD. 1911..Assistant Professor of Agricultural Engineering

B. S. A. in Agr., University of Nebraska, 1909.

JULES COOL CUNNINGHAM. 1911..Assistant Professor of Horticulture and Botany

B. S., Kansas State College, 1905.

INSTRUCTORS

ESTHER LEIPER COOPER, Ph. B.....Instructor in English, 1909

JESSIE MILDRED MACLEAN, A. B., A. M..Instructor in English, 1910

HARRY JOHN EVANS, B. S. A.....Instructor in Dairying, 1910

MAY CHASE, B. S.....Instructor in Mathematics, 1910

HENRY LOUIS EICHLING, B. S. in Agr....Instructor in Agronomy, 1911

EVAN F. FERRIN, B. S. A.....Instructor in Animal Husbandry, 1911

RALPH ALVIN CHITTY, B. S. A.....Instructor in Agronomy, 1911

MILTON HENRY HOFFMAN, M. Di.....Instructor in Agricultural Engineering, 1911

LESLIE CARSON NANNEY, B. S.....Instructor in Chemistry, 1911

* First date after the name indicates date of appointment to present position, the second date, when the first fails to do so, indicates the date of first appointment in the College.

LEETA BISMARCK SOUTHWICK, A. B., A. M..Instructor in Modern
 Language, 1911
 CHARLOTTE DRYDEN, Ph. B....Instructor in Public Speaking, 1911
 HUGO BECKMAN.....Instructor in Agricultural Engineering, 1911
 ARTHUR FERDINAND LUNGREN, B. S..Instructor in History, 1911

SHORT COURSES IN AGRICULTURE

Calendar

1912

FIRST SEMESTER

August 30-31, Friday, 8:00 A. M., to Saturday, 5:00 P. M. Registration-Classification Days.

December 20, Friday, 5:00 P. M. College Work closes.

1913

SECOND SEMESTER

January 17-18, Friday, 8:00 A. M., to Saturday, 5:00 P. M. Registration-Classification Days.

June 6, Friday. Summer Vacation begins.

REQUIREMENTS FOR ADMISSION

Any student desiring to enter any one of these courses must be, at least, seventeen years of age, and must present a certificate showing that he has satisfactorily completed the eighth grade of the public schools. If the applicant has attended high school, this certificate must also give his complete high school or academic record, and must be signed by the superintendent or principal. All applications for admission should be addressed to the *Registrar, Iowa State College*, who will furnish the proper blanks. These certificates should be filed with the *Registrar* as promptly as possible, and, at least, two weeks before the opening of the semester.

High School graduates who are able to meet the entrance requirements of the collegiate courses in Agriculture will not be eligible to the Two Year Course in Agriculture.

FEES AND EXPENSES

The entire expenses of a student need not exceed \$350.00 per College year.

Tuition. No charge for tuition is made to the students from the State of Iowa. To the non-residents, a tuition fee of \$50.00 per year is charged.

Incidental Fee. The regular incidental fee for the semester is \$12.00, but all students who classify during the classification period. Friday, and Saturday, before College work begins, will be charged only \$10.00 per semester.

Laboratory Fees. Laboratory fees at the actual cost of breakage

and usage are charged to the students, the Treasurer's receipt for such fees being required before the students are admitted to laboratories. For the amount of the fee in any course the student should refer to the description of courses, under the department in which the course is taught.

Board and Room. Students can secure furnished rooms and board in clubs or private families adjacent to the College grounds at from \$4.50 to \$5.00 per week.

The College Custodian, office in old office building, should be consulted by all new students, concerning rooms and rooming places, that undesirable rooms and houses may be avoided. For sanitary or any other reasons the College authorities reserve the right to forbid students from rooming in any particular house.

Text Books. All text books and stationery may be purchased at the College Book Store at about 20 per cent below the average retail price.

TWO YEAR COURSE IN AGRICULTURE

The two year course in agriculture is offered in order to meet the demand of young men who have not had the advantages of high school training, and who wish to obtain such preparation for practical agricultural work, as a two year course will afford. The work offered in this course is naturally of lower grade than the collegiate work and will have special application to practical problems in agriculture, in its various phases. Upon the completion of this course the student will be granted a certificate.

TWO YEAR COURSE IN AGRICULTURE

FIRST YEAR

First Semester

	Hours
Agricultural Engineering A1, Blacksmithing or	
Agricultural Engineering A2, Carpentry	1½
Animal Husbandry A1, Market Types of Cattle and Sheep	2
Animal Husbandry A5, Feeding and Management of Live Stock	2¾
Farm Crops A1, Corn	2¾
Horticulture A3, Fruit Growing	1¾
Botany A1, Agricultural Botany	2
Chemistry A57, Elementary Chemistry	2
Choice { English A14, Letters and Themes 3 }	
{ Literature A11, 3 }	3
Total	17½

Second Semester

Agricultural Engineering A1,	Blacksmithing	
or		
Agricultural Engineering A2,	Carpentry	1½
Agricultural Engineering A4,	Field Engineering	2
Animal Husbandry A2,	Market Types of Dairy Cattle, Horses and Swine	2
Animal Husbandry A6,	Feeding and Management of Live Stock	2½
Farm Crops A2,	Small Grains	2½
Horticulture A14,	Farm Forestry	2
Botany A2,	Farm Weeds and Seeds	2
Choice { English A15,	Letters and Themes	3}
{ Literature A11,		3}
	Total	17½

SECOND YEAR**Third Semester**

		Hours
Agricultural Engineering A5,	Farm Machinery and Farm Motors	2½
Animal Husbandry A3,	Breed Types of Cattle and Sheep	3½
Dairying A12,	Principles of Dairying	2½
Farm Crops A4,	Farm Management	3
Soils A1,	Soil Physics	3
Veterinary A1,	Sanitary Science and Obstetrics	3
Economic Science A22,	Rural Economics	2
	Total	19½

Fourth Semester

Agricultural Engineering A6,	Farm Buildings	2
Required three subjects {	Animal Husbandry A4,	Breed Types of Dairy Cattle, Horses and Swine 3½
	Animal Husbandry A7,	Animal Breeding, Feeding and Herdbook Study 3
	Animal Husbandry A8,	Poultry Management 2½
	Dairying A13,	Milk Testing 1½
		7½ to 9
Farm Crops A3,	Forage and Pasture Crops	2
Soils A2,	Soils and Fertilizing Materials	3
Horticulture A2,	Plant Propagation	2
	Total	16½ to 18

OPTIONAL STUDIES IN THE TWO YEAR COURSE IN AGRICULTURE

With the consent of the Dean of Agriculture, students having the prerequisite preparation, may elect subjects from the following list, in place of any study named in the above semester schedules, provided they have the equivalent of two and a half years of high school work, or have

passed up in advance part of the required work scheduled. Two year students may take an additional course in English in the second year with the approval of the Dean.

Course	Name of Subject	Hours Credit
Economic Science A15	Government in State and Nation	3
English A1	Grammar	5
English A2	Rhetoric and Composition	5
English A16	Elementary Grammar	3
English A17	Elementary Rhetoric and Composition	3
History A1	English History	5
History A2	Advanced American	4
History A16	National Period	3
Literature A11	English Classics	3
Literature A12	English Classics	4
Literature A13	English Classics	4
Mathematics A1	Algebra	5
Mathematics A2	Algebra	5
Mathematics A3	Algebra Review	5
Mathematics A5	Plane Geometry	5
Modern Language A5	German	5
Modern Language A6	German	5
Modern Language A5a	German	3
Modern Language A6a	German	3
Modern Language A30	Spanish	5
Modern Language A31	Spanish	5
Public Speaking A2	Declamation	1

AGRONOMY

Soils A1. Soil Physics. Third Semester. Physical and chemical condition of soils, seed beds, draining, plowing, harrowing, cultivating, rolling mulches, and soil management. Lectures two hours, laboratory lectures and demonstrations two hours, per week. Three hours' credit. Fee, \$1.00.

Soils A2. Soils and Fertilizing Materials. Fourth Semester. Improvement of soils; soil organisms, fertility, organic compounds, plant food, fertilizers, manures, crop rotations. Sandy, arid, alkali, acid, peat, and gumbo soils. Lectures two hours, laboratory lectures and demonstrations two hours, per week. Three hours' credit. Fee, \$1.50.

Farm Crops A1. Corn. First Semester. Corn production, seed ears, storing, testing, grading, planting, cultivating, and harvesting. Corn breeding, different varieties, growth, cost of production, marketing, and uses. Two lectures and one two-hour laboratory period per week. Two and two-thirds hours' credit. Fee, \$1.50.

Farm Crops A2. Small Grains. Second Semester. Varieties of soil, climate, preparation of the seed bed, seeding, harvesting, cost of pro-

duction, uses, etc. Score card practice and commercial grading. Two lectures and one two-hour laboratory period per week. Two and two-thirds hours' credit. Fee, \$1.50.

Farm Crops A3. Forage and Pasture Crops. Fourth Semester. Varieties, soiling crops, pastures; habit of growth, adaptation, palatability, and composition; seeding, handling, harvesting, etc. Two lectures per week. Two hours' credit.

Farm Crops A4. Farm Management. Third Semester. Farm management, rotations, special crops, buildings, labor and marketing. Specialized and general farming. Farm accounts. Two lectures and one two-hour laboratory and lecture period per week. Three hours' credit. Fee, \$2.00.

DAIRYING

A12. Principles of Dairying. Third Semester. Secretion and composition of milk, hand separators, testing dairy products, care of milk and cream on the farm, butter and cheesemaking on the farm, are all subjects; creamery problems. Recitation two hours, laboratory two hours per week. Two and two-thirds hours' credit. Fee, \$3.00.

A13. Milk Testing. One and two-thirds hours' credit. Fee, \$2.50.

ANIMAL HUSBANDRY

A1. Judging Market Types of Cattle and Sheep. First Semester. Two two-hour judging periods per week. Two hours' credit. Fee, \$2.00.

A2. Judging Market Types of Dairy Cattle, Horses and Swine. Second Semester. Two two-hour judging periods per week. Two hours' credit. Fee, \$2.00.

A3. Breed Types of Cattle and Sheep. Third Semester. Judging according to official standards. Origin, history, characteristics, and adaptability to climate and soil. Prerequisite, Animal Husbandry A1. Lectures two hours and two two-hour judging periods per week. Three and one-third hours' credit. Fee, \$2.00.

A4. Breed Types of Dairy Cattle, Horses and Swine. Fourth Semester. Judging according to official standards. Origin, history, characteristics, and adaptability to climate and soil. Prerequisite, Animal Husbandry A2. Lectures two hours and two two-hour judging periods per week. Three and one-third hours' credit. Fee, \$2.00.

A5. Feeding, Care and Management of Beef and Dairy Cattle. First Semester. Lecture one hour, laboratory two hours per week. Two and two-thirds hours' credit. Fee, \$2.00.

A6. Feeding, Care and Management of Horses, Hogs and Sheep. Second Semester. Prerequisite, Animal Husbandry A5. Lecture, one hour and laboratory, two hours, per week. One and two-thirds hours' credit. Fee, \$2.00.

A7. Animal Breeding, Feeding and Herd Book Study. Fourth

Semester. Animal breeding, balancing rations, economical feeding, pedigrees and herd books. Three lectures per week. Three hours' credit.

A8. Poultry Management. Fourth Semester. Poultry houses, yards, feeding, judging market types, incubation, brooding, anatomy of fowl, diseases, sanitation, caponizing, killing, dressing and marketing. Lectures two hours and one two-hour laboratory period per week. Two and two-thirds hours' credit. Fee, \$2.00.

HORTICULTURE

A2. Plant Propagation. Fourth Semester. Plant reproduction, seeds, seed testing, germination, storage, transplanting, grafting, budding and cuttage. Two two-hour practicums per week. Two hours' credit. Fee, \$1.00.

A3. Fruit Growing. First Semester. Orchard site, varieties, orchard culture, pruning, spraying and storage. One lecture and one two-hour practicum per week. One and two-thirds hours' credit. Fee, \$1.00.

A14. Farm Forestry. Second Semester. Farm woodlots, wind-breaks, forest influences, common timbers and their preservation. Two lectures per week. Two hours' credit.

AGRICULTURAL ENGINEERING

A1. Blacksmithing. First or Second Semester. Forging, welding and tempering iron and steel. Management and repair of machinery. Four hours shop work per week. One and one-third hours' credit. Fee, \$2.50.

A2. Carpentry. First or Second Semester. Joining, framing, and care of tools. Planning, framing and construction of farm buildings. Four hours shop work per week. One and one-third hours' credit. Fee, \$2.50.

A4. Field Engineering. Second Semester. Mensuration of land, surveying, land drainage, irrigation, road construction and farm fences. Drawing, lettering and map making. Recitation one hour, laboratory and lectures two hours, per week, a part of the laboratory period being used for recitation. Two hours' credit. Fee, \$1.50.

A5. Farm Machinery and Farm Motors. Third Semester. The development, construction, adjustment, repair and use of agricultural machinery. Principles of draft, the horse as a motor, the windmill, steam, gasoline and electric motors. Laboratory work devoted to the calibration and testing of machines and motors. Recitation two hours, and laboratory two hours, per week. Two and two-thirds hours' credit. Fee, \$2.00.

A6. Farm Buildings. Fourth Semester. Planning and construction of farm buildings, cost, convenience, lighting, ventilation and sanitation. Materials, plans and specifications. Recitations, one hour, and laboratory and lectures, two hours, per week. Two hours' credit. Fee, \$1.50.

VETERINARY

A1. Sanitary Science and Obstetrics. Third Semester. General hygiene; water supply, air and ventilation; food and the effects of quality of food; habitation; disposal of excreta; drainage and general rules for disinfecting. Physiological obstetrics, evolution, fecundation, sterility, gestation, hygiene of pregnant animals and parturition. Three hours' credit.

ZOOLOGY

A30. General Zoology. First Semester. General animal morphology and physiology, with special reference to mammals on the one hand and to worms and insects on the other. In the former the physiology of digestion and assimilation is the chief topic, because of its importance in stock feeding. In the latter these points in the structure and life history are treated that have an especial bearing on the worm, insect parasites, and insects injurious to crops dealt with in the next course, Zoology A31. One lecture or recitation and one practicum per week. Two hours' credit. Fee, \$3.00.

A31. Entomology. Second Semester. Life history, habits, and methods of combating the more important economic insects and worms. Both those destructive to farm and orchard crops, and also the chief forms parasitic on domestic animals, are studied. One lecture or recitation and one practicum per week. Prerequisite, Zoology A30. Two hours' credit. Fee, \$3.00.

BOTANY

A1. Agricultural Botany. First Semester. Seed germination, elementary principles of plant physiology; the root, shoot, lateral appendages, leaves, flower, fruit and seed, absorption of food materials, conduction of food, storage of food. Special attention is given to the terms used in Descriptive Botany, especially in its relation to Agriculture and Horticulture. One lecture and one practicum per week. Two hours' credit. Fee, \$2.00.

A2. Farm Weeds and Seeds. Second Semester. Injurious weeds, methods used to exterminate same; purity and vitality of agricultural seeds; methods used to detect these impurities and to determine vitality. State laws governing destruction of weeds and restriction and sale of agricultural seeds. Two hours' credit.

CHEMISTRY

A57. Elementary Chemistry. First Semester. Principles of chemistry as applied to agriculture. Two hours' credit.

ECONOMIC SCIENCE

A15. Government in State and Nation. City, county, and state governments; constitutional conventions; constitutions and "Supreme Law;" checks and balances; the presidency, senate and house of repre-

representatives; general powers of Congress; judicial system, federal and state; division of power; comparison with other federal governments; spoils system and civil service; and government of territories and colonies; text book, supplemented by papers and library work. Recitations, three hours per week.

A22. Rural Economics. Third Semester. Lecture and reading course. History of agriculture in the United States; the crop areas: live stock areas; imports and exports of agricultural products; markets; land tenure; agricultural organizations; coöperation; and rural social problems. Two hours' credit.

LITERATURE

A11. English Classics. A course intended to acquaint the student somewhat with good literature, not only technical or scientific, but also general; an attempt to secure his appreciation of what is good in each. Three hours' credit.

A12. English Classics. A course in literature intended merely to supplement and complete this study for those who have not finished a fully accredited four year high school course. It is taken up mainly as an approach to a more intelligent and discriminating appreciation of literature, and an incentive to a wider and more thoughtful reading. The authors and works studied will be selected with the view of repeating as little as possible what the students have already studied. Prerequisites, English 1 and 2, or their equivalent, and the major part of the work in literature in a fully accredited high school or its equivalent. Four hours' credit.

A13. English Classics. To be given in lieu of A12, the only difference being that the classics read shall be other than those read in the First Semester. The course is intended to aid students who are making up work for College Entrance, to secure additional literature. Four hours' credit.

ENGLISH

A14. Letters and Themes. First or Second Semester. Writing letters of the various forms and types and short papers on familiar subjects. Emphasis placed on correctness and clearness with as much attention as possible to the qualities of force and interest. Short reviews of fundamental principles, when necessary. Three hours' credit.

A15. Letters and Themes. Second Semester. A continuation of Course A14. Three hours' credit.

A16. Elementary Grammar. A course intended to give the student a working knowledge of the English sentence, a study of the various elements, and of their relation to each other and to the sentence as a whole. Three hours' credit.

A17. Elementary Rhetoric and Composition. A course continuing the work in A14 and A15 in order more thoroughly to prepare the student for the writing of short practical themes. Three hours' credit.

A1. The Sentence. A review of grammar such as would be required in the twelfth grade of the high school. It presupposes a knowledge of elementary grammar, and includes work in correcting common errors, punctuation, analysis of good modern prose, and daily drill in sentence construction and original composition. Five hours' credit.

A2. Rhetoric and Composition. Fast review of rhetoric and composition, and also of literature. Prerequisites, English A1 or its equivalent, with the major part of a high school course in rhetoric and composition, and also in literature. For the first ten days there will be a rapid review of grammar, with essays on simple themes. Students who show the need of further review will be required to make up the deficiency. Five hours' credit.

MATHEMATICS

A1. Algebra to Involution. Special stress is laid upon the statement of definitions and the demonstration of principles. It is exceedingly desirable that students taking this course shall have made some preparatory study of the fundamental algebraic operations, though strong students with an earnest purpose can by diligent application, carry the course without such previous preparation.

A2. Algebra, Involution to Ratio and Proportion. Involution of Evolution, Radicals, Pure and Affected Quadratic Equations. Prerequisite, Course A1. At the completion of this course students are expected to have such grasp of algebra through quadratics as will enable them to handle its principles up to this point without error and perform the operations required with reasonable rapidity and accuracy. Recitations, five hours per week.

A3. Algebra Review. This course, which covers all fundamental principles up to and including radicals and quadratics, takes the place of the review in algebra given in most high schools and corresponds to the review in algebra given in an increasing number of the best high schools of the state.

The student is introduced to a quality of work demanding a broad view of principles and methods, and a marked degree of skill in algebraic manipulation.

The course is intended primarily for students who, having taken elementary algebra in the high school, need a thorough review before entering advanced work, but it may be taken by students who show evidence of a thorough knowledge of algebra through simple equations and at least a brief course through radicals. Recitations, five hours per week.

A5. Plane Geometry. Fundamental definitions and axioms, theorems relating to rectilinear figures and the circle, measurement of angles; doctrine of limits; theory of proportion; similar polygons; comparison and measurement of the surfaces of rectilinear figures; measurement of the circle, and geometrical construction of plane figures. The proofs outlined must be fully amplified; definitions must be stated with precision;

authority cited must be given in full and the logical steps in demonstration must be so arranged and presented as to constitute a complete and rigid proof. The student must understand each proposition and be able to state the demonstration in concise geometric language. Special emphasis will be laid upon the demonstration of original exercises. Prerequisite, Course A1. Recitations, five hours per week.

HISTORY

A1. **English History.** Political, constitutional, religious, social and economic development of Great Britain. Special attention to those influences which have affected American history. Text-book, library and written work. Prerequisite, one year of general history. Five hours' credit.

A2. **Advanced American History.** An advanced and comprehensive view of American development. It corresponds to the American history offered in last year in accredited high schools. Text-books, lectures and assignments. Four hours per week.

A16. **The National Period.** A more mature and comprehensive view of American development from 1789 to the present. Text-book, lectures and assignments. Three hours' credit.

PUBLIC SPEAKING

A2. **The Declamation.** A course planned to help the student get command of himself. Attention given to voice building and bodily expression. Besides this technical work, students are assigned individual selection for practice and each is met for private rehearsal at regular intervals. One hour per week.

MODERN LANGUAGE

A5. **Elementary German.** Grammar and reading, with constant practice in pronunciation and in writing German. Bierwirth's Beginning German, and Seeligmann's Altes und Neues. Five hours' credit.

A6. Continuation of Course 5. Grammar and reading. Texts such as Storm's Immensee, Gerstäker's Germelhausen, Wilhelm's Einer musz heiraten, and Zschokke's Der zerbrochene Krug. Five hours' credit.

5a. **Intermediate Grammar.** Review of grammar, reading and composition. Bierwirth's beginning German, Hewett's German Reader. (Open to those who have offered one year of German for admission) Three hours' credit.

6a. **Intermediate German.** Continuation of Course 5a. Grammar, selected reading and composition. Three hours' credit.

A30. **Elementary Spanish.** Grammar, reading, composition, and conversation. Much attention is given to pronunciation. Hills and Ford's Spanish Grammar, and Hills' Spanish Tales. Five hours' credit.

A31. Continuation of Course 30. Grammar and reading of such

texts as Valera's Pepita Jimenez, or Alarcon's El Capitan Veneno, and Carrion's Zaragüeta. Five hours' credit.

ONE YEAR COURSE IN DAIRYING

The One Year Course in Dairying is designed to meet the needs of those who want to acquire a knowledge of practical dairy methods for the purpose of being enabled to operate a creamery, cheese factory or ice cream factory. This course is also of value to dairy farmers who are unable to take a complete college course. Students completing this course will be given certificates when evidence is furnished that they have successfully for one year operated a creamery or other dairy establishment.

ONE YEAR COURSE IN DAIRYING

FIRST SEMESTER

Dairying A1.	Dairy Practice	6
Dairying A2,	Buttermaking	2
Dairying A3,	Milk Testing	2
Agricultural Engineering A7,	Dairy Engineering	1½
Animal Husbandry A19,	Feeding Dairy Stock	2
Chemistry A28,	Dairy Chemistry	1
Dairying A6.	Dairy Bacteriology	1
Soils A3.	Soils and Fertilizing Materials	2
Total semester hours		17½

SECOND SEMESTER

Dairying A26.	Judging Dairy Products	1
Dairying A4.	Dairy Practice	6
Dairying A8.	Cheese Making	1
Dairying A5,	Bookkeeping	1
Dairying A20,	Factory Management	2
Animal Husbandry A18,	Breeding and Judging Dairy Stock	2
Dairying A21,	Preparation of Ice Cream and Ices	1½
Chemistry A29,	Dairy Chemistry	2
Farm Crops A3.	Grains, Forage and Pasture Crops	2
Total semester hours		18½

A1. Dairy Practice. Includes practical work in buttermaking, cheesemaking, ice cream making, pasteurization of milk and cream, preparation of starters, testing of dairy products, and refrigerating engineering. Five to seven hours laboratory work per day. Six hours' credit.

A2. Buttermaking. It includes a study of the composition of milk and dairy products, the principles of gravity and centrifugal separation of cream, cream ripening, preparation of starters, churning and preparation of butter for market. Two hours' credit.

A3. **Milk Testing.** A study of the Babcock test, and of the Farrington and Mann's test for determining acidity, the use of the lactometer for detecting adulterations, and also the composite sampling and testing of individual cows. Two hours' credit.

A4. **Dairy Practice.** Continuation of A1. Six hours' credit.

A5. **Bookkeeping.** Study of the best form of bookkeeping for the factory business. One hour's credit.

A8. **Cheese Making.** Includes common and fancy cheese as Limburger, Brick, Swiss Roquefort, Sage, Stilton, Pineapple and Gouda. Sixteen lectures per semester.

A20. **Creamery Management.** A study of the underlying principles in the management of a local creamery. Two hours' credit.

A21. **Preparation of Ice Cream and Ices.** A study of the preparation of ice creams, lacto and ices. One recitation and one two-hour laboratory. One and two-thirds hours' credit.

A26. **Judging Dairy Products.** Includes the judging of butter, milk and cream, ice cream, sherbert, and the various kinds of cheese, paying special attention to score cards. One hour's credit.

AGRICULTURAL ENGINEERING

A7. **Dairy Engineering.** Management, care and operation of steam and gasoline engines and refrigerating machinery. Laboratory work devoted to the operation, adjustment and testing of boilers and engines, also soldering, plumbing, etc. Recitation, two hours, and laboratory, four hours, per week. One and two-thirds hours' credit. Fee, \$2.50.

ANIMAL HUSBANDRY

A18. **Breeding and Judging Dairy Stock.** Score card and comparative judging. Principles, methods and practice of breeding, and improvement. Two hours' credit. Lecture, one hour, and laboratory, three hours, per week.

A19. **Feeding Dairy Stock.** Feeding for economical production, composition and use of various feeding materials, influence of various feeding stuffs on quantity, quality and composition of milk, butter and cheese. Two lectures per week.

CHEMISTRY

A28. **Dairy Chemistry.** An elementary course arranged to meet the needs of the students in the one year course in dairying. One lecture and one laboratory, one and one-half periods. Two hours' credit. Deposit, \$3.00.

A29. **Dairy Chemistry.** A continuation of course A28. Recitation, one hour, and laboratory, one and one-half periods. Two hours' credit. Deposit, \$3.00.

AGRONOMY

Farm Crops A3. Forage and Pasture Crops. Fourth Semester. Varieties, soiling crops, pastures, habit of growth, adaptation, palatability, and composition, seeding, handling, harvesting, etc. Two lectures per week. Two hours' credit.

Soils A3. Soils and Fertilizing Materials. First Semester. Improvements of soil, soil organisms, fertility, organic compounds, plant food, fertilizers, manures, and crop rotations. Sandy, arid, alkali, acid, peat and gumbo soils. Lectures, two hours, laboratory lectures and demonstrations, two hours, per week. Two hours' credit. Fee, \$1.50.

ONE YEAR COURSE IN POULTRY HUSBANDRY

The One Year Course in Poultry Husbandry is designed to meet the needs of those who desire to spend one year in study.

ONE YEAR COURSE IN POULTRY HUSBANDRY

FIRST SEMESTER

Animal Husbandry A30,	Breed Types of Poultry	2 $\frac{2}{3}$
Animal Husbandry A31,	Poultry Management	2
Animal Husbandry A32,	Practice in Poultry Feeding	1
Animal Husbandry A38,	Poultry Fattening	1
Animal Husbandry A43,	Market Types of Poultry	2
Animal Husbandry A19,	Feeding Dairy Stock	2
Horticulture A3,	Fruit Growing	1 $\frac{1}{3}$
Agricultural Engineering A6,	Farm Buildings	2
Farm Crops A4,	Farm Management	2
		—
Total semester hours		16 $\frac{1}{3}$

SECOND SEMESTER

Animal Husbandry A33,	Incubator Practice	1
Animal Husbandry A34,	Brooder Practice	1
Animal Husbandry A37,	Poultry Management	2
Animal Husbandry A39,	Poultry Judging	2
Animal Husbandry A42,	Marketing Poultry Products	2
Animal Husbandry A44,	Practice in Packing and Judging Poultry Products	1
Animal Husbandry A6,	Feeding and Management	1 $\frac{1}{3}$
Animal Husbandry A7,	Animal Breeding and Herd Book	3
Horticulture A14,	Farm Forestry	1
Agricultural Engineering A2,	Carpentry	1 $\frac{1}{3}$
		—
Total semester hours		16

ANIMAL HUSBANDRY — POULTRY COURSES

A30. Breed Types of Poultry. This course consists in the scoring and judging by comparison the more important varieties in accordance with the American Standard of Perfection. Two and two-thirds hours' credit. Lecture, one hour and two two-hour laboratories per week. Fee, \$2.00.

A31. Poultry Management. This course includes a study of Poultry buildings, the arrangement of buildings and yards on the general farm, the planning of poultry farms, and feeds and feeding. Two hours' credit. Lectures, two hours per week.

A32. Practice in Poultry Feeding and Management. The student will be given charge of a pen of fowls and will be required to keep a record of the amounts and cost of food consumed, gains made, eggs produced and calculate the profit or loss. This work will cover a period of three weeks, and the student must be present morning, noon, and afternoon, time to be arranged by appointment with instructor. One hour's credit. Fee, \$2.00.

A33. Incubator Practice. Each student will be given charge of one or more incubators for the period of one hatch and required to keep the records of fuel consumed, temperatures, infertile eggs, dead germs, dead in shell, chicks hatched, and reckon the cost of incubation. This course will cover a period of four weeks and the student must be present morning, noon and afternoon, time to be arranged by appointment with the instructor in charge. One hour's credit. Fee, \$2.00.

A34. Brooder Practice. Each student will be given charge of chicks in a brooder for four weeks from time of hatching and must keep records of temperatures, fuel and foods consumed, gains made, mortality and calculate the cost of brooding. The student will be required to be present morning, noon and afternoon, time to be arranged by appointment with instructor. One hour's credit. Fee, \$2.00.

A37. Poultry Management. This course continues the work started in course A31 and takes up in a general way, breeding, marketing, incubating and brooding. Two hours' credit. Lectures, two hours.

A38. Practice in Poultry Fattening. Each student will be given charge of, and feed several lots of fattening stock, comparing different methods and rations for fattening poultry. Records must be kept showing the amounts and cost of food fed, amounts and cost of gains in weight, cost per pound of gain, and calculations made of the profit or loss on each lot of stock. This course will cover a period of three weeks and the student must be present morning and evening, time to be arranged by appointment with instructor. Fee, \$2.00.

A39. Advanced Poultry Judging. This course is a continuation of course A30. Lectures and laboratory, two two-hour periods per week. Two hours' credit. Fee, \$2.00.

A42. Marketing of Poultry Products. Includes the study of the

market classifications of poultry, eggs and feathers, methods of dressing, packing, shipping, selling, requirements of different markets, poultry and egg boards, cold storage of poultry and eggs. Two lectures per week. Two hours' credit.

A43. Market Types of Poultry. This includes a study of the various types of market poultry. It will include score card and comparison judging of the various breeds of poultry with reference to market requirements. Lectures and laboratories, two two-hour periods per week. Two hours' credit. Fee, \$2.00.

A44. Practice in Packing and Judging Poultry Products. Includes practice in the modern methods of preparing poultry and eggs for market and judging dressed poultry and eggs. Lectures and laboratories, one two-hour period, per week. Fee, \$2.00.

Winter Short Courses

CHARLES FRANKLIN CURTISS, DEAN OF AGRICULTURE

Agronomy, Animal Husbandry, Poultry, Dairying, Horticulture, Soils, Agricultural Engineering and Home Economics

The special short course in agriculture, which originated in this institution in January, 1900, met with popular favor. The work has proven to be of great practical value and the attendance has extended far beyond the borders of the state and has reached nearly a thousand annually. A large amount of instruction is crowded into a brief period. Class and laboratory work extend from 8:00 A. M. to 5:00 P. M. daily except Sunday, and the evenings are devoted to convention programs consisting of lectures and general discussion of topics of interest to those in attendance. This is an intensified system and a modern method of imparting instruction and inspiration to busy, practical men and women whose lives are devoted to agricultural pursuits. Many of the most prominent and successful men of the state and nation are annually attracted to these sessions. It is believed that the work furnished during the coming winter will be more practical and more popular than at any previous session.

Calendar

1912-1913

December 30, Monday, 8:00 A. M. Registration.

Monday, 10:00 A. M. Classes Begin.

January 12, Friday, 5:00 P. M. Session Closes.

Fees and Expenses

The fees required in the different courses are payable at the treasurer's office. The enrollment fee is \$5.00 and covers all charges of this nature, except in the Dairy Department, where higher rates are charged on account of the greater expense involved in giving the work. Board and room may be had near the college for \$4.50 to \$5.00 per week.

A Bureau of Information will be maintained in the new Agricultural Hall to assign boarding places.

ANIMAL HUSBANDRY

In response to widespread demand for special short course instruction in the judging and feeding of animals, a two weeks' course has been established during the winter vacation. This course will be devoted exclusively to score card practice, and judging of horses, cattle, sheep, and hogs, and lectures on feeding the same.

In this work special attention will be given to the selection of animals best suited for feeding purposes. Good specimens of the highest type of fat steers and ideal representatives of all the various breeds will be used for class work. At the conclusion of the cattle work a slaughter test and block demonstration of the various market types of steers will be conducted under the supervision of John Gosling, Kansas City, Missouri.

POULTRY HUSBANDRY

In the ten days available for instructional purposes, lectures, demonstrations and practical exercises will be given in the most important points of poultry management. Some of the topics that will be discussed in the lectures are The Importance of the Poultry Industry, Selection of Poultry Farms, Building Poultry Houses, Feeding for Egg and Meat Production, Selection of Breeding Stock, Incubation, Brooding, Raising Chicks, Caponizing, Killing, Dressing and Marketing of Poultry, Diseases and Parasites. Frequent use will be made of charts and lantern slides in this work.

The practical exercises and laboratory work will consist of exercises in studying poultry houses, incubators, brooders, anatomy of the fowl and egg, study of feeds, killing and dressing of fowls, selection of breeding stock, preparing fowls for exhibition.

AGRONOMY

Farm Crops. The Agronomy Department will offer an excellent course in Farm Crops and Crop Production this year. This work will be so arranged as to meet the demands of the men who have already attended one or more Short Courses here, as well as those who will attend this year for the first time. The first year men will devote much of their time to judging work, while the more advanced students will give more time to the consideration of some of the latest experimental work, as this may be related to farm practice.

Corn. The characteristics and adaptation of the various varieties of corn will be studied fully. Aside from the corn judging work, practice will be given in corn grading, in order that we may meet to better advantage market demands. Considerable attention will also be given to various methods of testing corn.

Small Grains. Wheat, oats and barley will be studied carefully, tak-

ing up, aside from the judging and grading, a study of variety characteristics and adaptation, methods of seeding, etc.

Forage Crops and Grasses. Our grass lands are not giving as great returns as they should. Aside from the consideration of preparation of seed beds, seeding and curing, a study will be made in the laboratory of the characteristics of the more important grasses and legumes.

Cereal Breeding. Considerable attention will be given to improvement of corn and small grains by systematic breeding.

Farm Management. Some investigations have been in progress in this state which will be found of great interest and value. A practical, thorough study of a system of farm accounts is a special feature.

SOILS

A series of lectures and demonstrations dealing with soil management and the fertility problem with special reference to Iowa soils. Valuable facts and data will be presented regarding commercial fertilizers, green manures, barnyard manures, the use of leguminous crops, and indirect fertilizers, such as lime. In addition to the fertility problem, special emphasis will be placed upon methods of plowing, cultivating, preparing the seed bed, etc.

HORTICULTURE AND FORESTRY

The subjects will be presented by lectures in some of which use will be made of charts and lantern slides. Also demonstrations will be given in pruning, grafting, making cuttings and the preparation and application of spray materials. A collection of fruits and vegetables will be kept on exhibition during the second week of the short course. Various types of modern spraying apparatus will be shown in the Laboratory of the Department of Agricultural Engineering. The College Campus affords a rare opportunity for studying the deciduous and coniferous trees for shade and ornamental planting and the effective grouping of shrubs for the lawn and park. The plantations also give an excellent opportunity for the study of farm wood lots and trees suitable for such planting.

DAIRYING

Course 1. Dairy Demonstrations, Buttermaking, Factory Management, Bacteriology, Testing Milk and its Products, Scoring Dairy Products, Refrigeration, Dairy Engineering, Ice Cream Making, Feeding and Breeding Dairy Stock. This course is especially designed for buttermakers, and ice cream makers with some experience.

A fee of \$10 will be charged each student. This will cover the necessary expenses of this course, excepting board. Students should provide themselves with white suits, which can be procured for \$1 per suit in local stores.

Course 2. Dairy Practice, Buttermaking, Cheesemaking, Scoring Dairy Products, Bacteriology, Care of Milk and Cream, Ventilation of Dairy Barns, Judging Dairy Stock and Swine, Feeding and Breeding Dairy Stock, Poultry, Obstetrics and Tuberculosis, Our Record Testing Associations.

Silo and Its Construction, two lectures.

Steam and Gasoline Engines, two lectures.

This course is offered by the Animal Husbandry and Dairy Departments and is intended for dairy farmers, their wives, sons and daughters. It will include a thorough study in milk production, care of milk on the farm, buttermaking and cheesemaking on the farm, etc.

The afternoon of each day will be given over to practical demonstrations and the forenoons to lectures.

A fee of \$5.00 will be charged to cover the necessary expenses.

AGRICULTURAL ENGINEERING

A series of lectures on various phases of agricultural engineering. These lectures and demonstrations have in the past years been well received and many will be glad to learn that additional work of this nature will be added this year. These lectures will not conflict with the work scheduled by other departments and are designed to be of general interest and will be illustrated by lantern views and accompanied with demonstrations, where possible.

The following list of subjects will be discussed: Farm Machinery and its Management, Modern Silo Construction, The Road Problem, The Use of Cement and Concrete on the Farm, Laying out the Drainage System, The Gasoline Engine and its Successful Operation, Farm Building Construction, Corn Growing Machinery.

HOME ECONOMICS

The course is designed for all women who are interested in the practical and scientific working out of household problems and who are unable to avail themselves of a regular course in Home Economics.

Hundreds of agricultural men and their sons yearly take advantage of the Short Courses which deal with the problems of the farm, such as feeding of cattle, judging of corn, study of soils, etc. It is to meet the demand of Iowa women in their interest shown in the correct feeding of the family, the judging and selecting of materials used in the home, and the study of sanitary conditions which lead to the health, comfort and happiness of the family, that this course has been established and carried on for the past four years.

The course consists of the following subjects: Practical Lessons in the Values and Cookery of Foods; Foods for School Children, Growing Boys and Girls, Adults in Active Life, the Aged and Invalids; Methods of Preparing and Serving These Foods.

Practical course in Domestic Art is offered which deals with the principles of home garment making; lectures upon the choice of materials

suitable for garments of various kinds, upon the subjects of home decoration and furnishing, home sanitation and the care of sick will be given throughout the course.

VETERINARY LECTURES

The series of lectures will include tuberculosis and other diseases of cattle and swine. The prevention, control, and eradication of the infectious and contagious diseases will receive special emphasis, including the application of sanitary principles involved in each case. On account of the increasing importance of the eradication of bovine tuberculosis these lectures should be of special interest to all. The new serum treatment for the prevention of hog cholera will also be discussed.

The series will also include the lectures on Lameness and Horse-shoeing, including diseases of the foot. These subjects will be considered from a scientific standpoint, but described in a way so as to be understood by everybody.

The Conformation and Soundness of the horse will be taken up and illustrated on the live animal. Those points which should be borne in mind in the breeding of farm animals will receive special emphasis.

While it is impossible to give a course in Veterinary Medicine, the subjects of especial interest and immediate importance to the agriculturist will be considered as well as their practical application to farm conditions.

BOTANY

The laboratories of the Botany Department in Central Building will be open from 8 to 9 and 4 to 5 each day, for work in seed testing, identification and examination of weeds and weed seeds, or other special work that may be arranged with Dr. Pammel, head of the department. Special attention will be given to the identification of weeds common to Iowa farms, and to the provisions of the Iowa weed laws.

A special course of instruction will be arranged to meet the needs of seedsmen with reference to the requirements of the seed inspection law.

SPECIAL WORK FOR BOYS AND GIRLS

There will be special classes for Juniors (boys and girls between 10 and 18 years).

These classes will be in charge of persons particularly skillful in teaching boys and girls and the work will be especially adapted to them.

The Third Annual State Junior Contest will be held at the College during the time of the Short Course at which prizes are offered for the best corn, oats, potatoes, cooking, sewing, essays, etc.

At this contest the Boys' Corn Judging teams will compete again for the beautiful \$250 Kimball's Dairy Farmer trophy.

There will also be offered this year suitable premiums to the girls for the best judging team in domestic science. Localities are

urged to send teams of boys and girls (three persons in each) to compete for these trophies.

The work in the special Junior classes will aid in preparing the boys and girls for these contests.

ARMOUR SCHOLARSHIPS

The Iowa State College has since the Armour Scholarships were established, won from \$1,500 to \$2,000 annually, which is awarded at the close of each short course in the form of scholarships of \$250 each, restricted to worthy young men who are dependent on their own resources and who have not had collegiate work. These scholarships have made it possible for many young men of limited means to obtain a college education. This generous action on the part of Mr. Armour is significant not only on account of its far-reaching results, but in the recognition of the value of college training for agricultural pursuits by the great leaders of business enterprise in America. The conditions governing these scholarships are herein stated.

The contest will begin at the lower pavilion at 8 o'clock, Saturday morning, January 4.

The following classes will be judged:

Corn. One class of Reid's Yellow Dent; one of Leaming; one of Boone County White.

Stock. Two classes of cattle; two of horses; two of sheep, and two of swine.

These scholarships will be awarded to students under twenty-one years of age of limited means, who are upon their resources and who would otherwise be unable to secure a college education, and who have not had previous college work.

The winners of these scholarships will be expected to meet the entrance requirements for one of the regular collegiate courses in Agriculture in the Iowa State College. The young man to whom a scholarship is awarded may have until August 31, 1913, in which to qualify and enter as a regular student. A scholarship not duly accepted and qualified for, may at the end of the period above named be awarded to the candidate having the next highest standing.

The scholarships will be paid in monthly installments, on the order of the Dean of Agriculture, after the student is regularly enrolled and may be withheld in case of unsatisfactory work or misconduct on the part of the student.

Students wishing to enter this contest will be expected to file their names with Dean Curtiss Friday afternoon between two and five p. m.

Summer School

EDGAR WILLIAMS STANTON, ACTING PRESIDENT

CHARLES FRANKLIN CURTISS, DEAN OF AGRICULTURE

ASHLEY VAN STORM, DEAN OF SUMMER SCHOOL

June 17 to July 27

The farmer is not the only man who has become interested in scientific agriculture. Teachers, ministers, editors, bankers, lawyers, doctors, laborers, landlords, merchants and all other classes of people are thirsting for a better knowledge of the principles and processes of improved agriculture. A similar awakening has occurred regarding better home-making and better living.

Coincident with this has been the growth of the great educational movement for the teaching of the industrial subjects in our public schools.

Educators are insisting that to properly educate a child we must cultivate the head, the heart and the hand and exercise them upon those things which constitute the child's environment.

Parents are demanding that the schools shall give to the boys and girls a more practical education, an education that shall fit them for the duties of life.

It is felt that this great Institution so generously endowed by the State should bend its energies to the solution of these problems and should bear the responsibility of leadership in industrial education which the State and nation has placed upon it. It has been doing this for regular college students through its regular college courses and for the adult farmers and their families through its winter Short Courses, but there remains a large number who cannot be so served in this way and yet upon whose improvement depends in a great degree the future growth of industrial education in our State.

To meet the needs of these, the teachers, ministers, business and professional men and women who cannot attend the college during the regular college year, this Summer School has been established. It is to commence June 17th and continue for six weeks and is to be accompanied by conventions and conferences of different classes of people interested in the solution of our industrial problems, particularly our rural problems.

Courses will be offered in Animal Husbandry (including Poultry Husbandry), Dairying, Farm Crops, Soils, Horticulture, Manual Training, Household Economics and subjects related thereto, such as Chemistry, Botany, Zoology, Economics, etc.

The class, laboratory, and field work in agricultural, manual training and household subjects will be devoted mainly to improving the student's

knowledge of the subject matter with some consideration given to methods of presentation.

As the pedagogy of these subjects is new, special conferences will be held, devoted to plans of developing industrial work, methods of teaching, equipment, correlation with other school work, material, text-books, courses of study and other subjects that will aid teachers to carry forward the work in their own schools.

To make the work specifically practical, conferences will be held for rural teachers and for high school teachers and other conferences will be organized as the need is manifest.

The work will include judging horses, cattle, sheep and hogs both from breed and market viewpoints; feeding, care and management of stock with some reference to the laws of inheritance, selection, breeding and to the history of breeds.

The poultry course will include varieties, their history, characteristics, care and management with practical work in judging: Eggs, incubators and incubation; brooders and brooding; buildings and grounds, marketing, etc.

Dairying will consider care and testing of milk and cream, butter making and judging, use and care of the separator and other phases of butter and cream methods of especial value to those present.

The Farm Crops work will be devoted to the judging of corn and the small grains; selecting, testing and preparing seed; methods of cultivation, crop enemies and their eradication; types, varieties, history, uses and methods of improvement of the various crops.

In the Soils work the elemental phases of the subject will be considered including soil areas of Iowa, origin, classification, characteristics, physical properties, moisture, temperature, capillarity, permeability, washing, cultivation, drainage, tillage, crop rotation, preservation of fertility and many other interesting topics.

The Horticultural work will concern itself with the garden, orchard and the home and school grounds including such useful subjects as fruits, flowers, vegetables, grafting, layering, budding, spraying, troublesome pests, what to plant and how to plant it on school and home grounds.

Courses in wood work will be given for both country and city schools, dealing with the making of interesting useful articles, care and handling of tools, principles, working from plans, and finishing.

Household economics will include both lecture and laboratory work in cooking, sewing, sanitation and decoration. The fundamental principles will be taught and will be illustrated through the new and thoroughly equipped domestic technology building. Each student will be given practical work in the cooking and sewing laboratories.

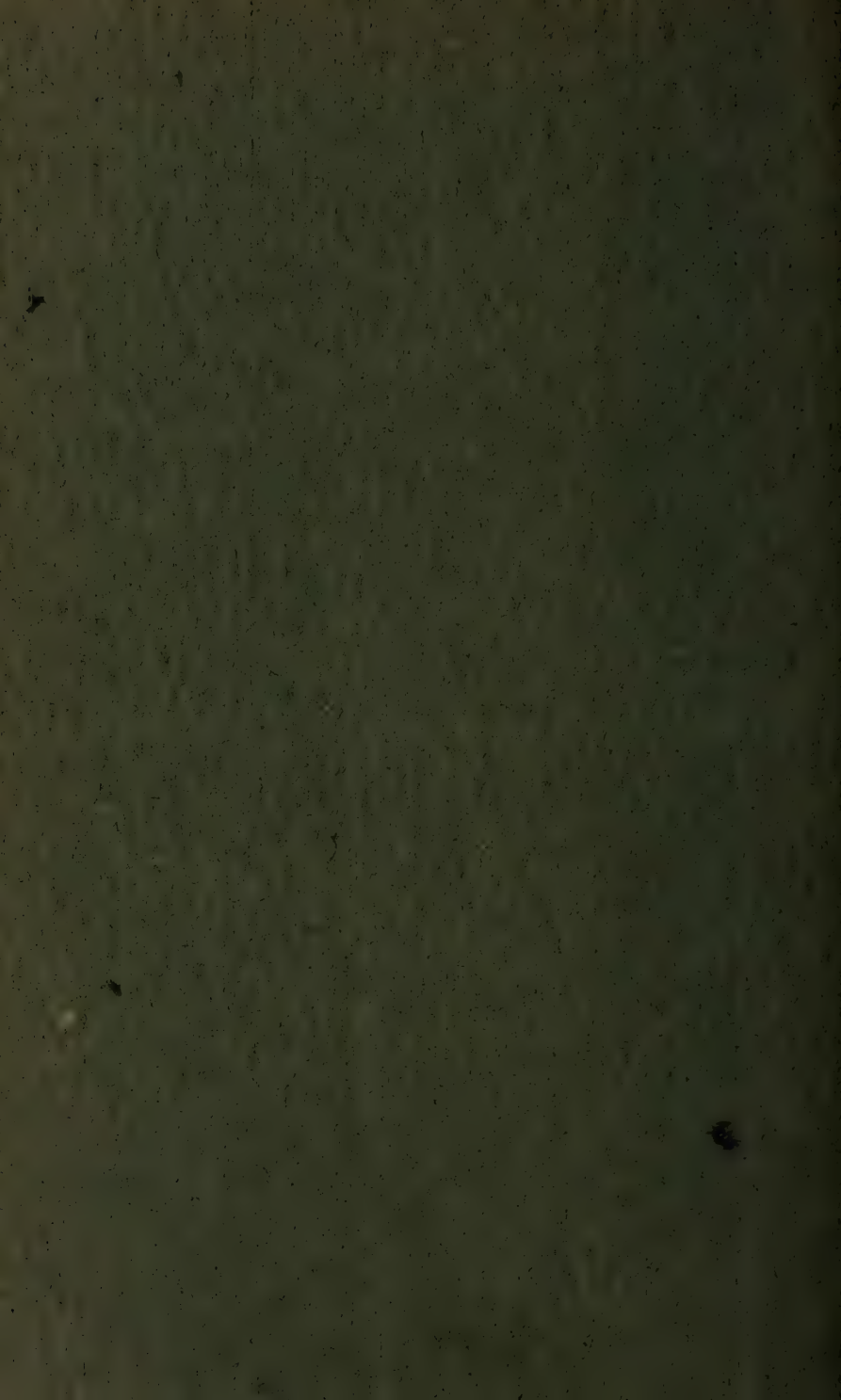
Those professional subjects necessary to procure a special state certificate for agriculture and home economics will be offered.

Special attention will be given the consideration of general problems

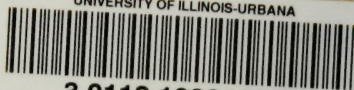
of rural sociology such as the rural church, school, good roads, clubs, improvement of social conditions, home improvements and others.

Superior speakers will address the Summer School throughout the session on important phases of the subjects being considered.

Special efforts will be made to get the largest amount of pleasure out of the beautiful campus and surroundings and also to pack every working hour full of valuable and helpful knowledge.



UNIVERSITY OF ILLINOIS-URBANA



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